# NOTTAWASAGA VALLEY CONSERVATION REPORT

1964

ONTARIO

DEPARTMENT OF ENERGY AND RESOURCES MANAGEMENT

CONSERVATION AUTHORITIES BRANCH

Water and wind erosion are controlled by grassed waterways and well placed forest cover.

DEPARTMENT OF ENERGY AND RESOURCES MANAGEMENT


HON. J. R. SIMONETT
Minister

T. R. HILLIARD
Deputy Minister

A. S. L. BARNES
Director, Conservation Authorities Branch


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TORONTO
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Two hundred and fifty copies of this report
have been prepared, of which this is
Number 49

## CONSERVATION AUTHORITIES BRANCH
## TECHNICAL STAFF

Director:

A. S. L. BARNES, B.Sc.F., R.P.F.

Chief Conservationist:

F. G. JACKSON, B.Sc.F., R.P.F.

Chief Engineer:

J. W. MURRAY, B.A.Sc., P.Eng.

Hydraulic Engineering:

F. J. FORBES, B.S.A., B.A.Sc., P.Eng.
P. N. GRYNIEWSKI, B.A.Sc., M.S.A., P.Eng.
C. R. LEUTY, B.S.A., P.Ag.

Hydrometeorology:

D. N. McMULLEN, B.A., F.R.Met.S.
B. P. SANGAL, M.Sc., P.Eng.

Land Use and
Supervisor of Field Officers:

A. D. LATORNELL, B.S.A., M.S., P.Ag.

Forestry:

P. M. R. HARVIE, B.Sc.F., R.P.F.

Wildlife and Recreation:

K. M. MAYALL, B.Sc.F., M.A., R.P.F.

Conservation Authority Field Officers:

W. D. ADLAM, B.Sc.F.
R. V. BRITTAIN, B.Sc.F., R.P.F.
J. A. CARRUTHERS, B.Sc.F.
A. W. CHALK, B.Sc.F., R.P.F.
A. D. CHAMBERS, B.Sc.F.
B. F. FINDLAY, B.A.
P. W. GILL, B.Sc.F.
H. G. HOOKE, B.Sc.F., R.P.F.
L. N. JOHNSON, B.S.A., P.Ag.
J. F. KING, B.Sc.F.
M. D. KIRK, B.Sc.F., R.P.F.
J. T. McCAULEY, B.S.A., P.Ag.
A. W. McCLELLAN, B.S.A.
D. J. MURRAY, B.Sc.F.
K. G. MUSCLOW, B.Sc.F., R.P.F.
O. I. STIRAJS, B.Sc.F., R.P.F.
B. W. VANDERBRUG, B.S.A., P.Ag.
S. B. WHITE, B.Sc.F., R.P.F.

## AUTHORSHIP

Final reports for all sections were completed by the senior staff members of the Conservation Authorities Branch.

For the Recreation section the field survey was conducted and original draft of the report written by Kenneth Kelly, M.A.

## ACKNOWLEDGEMENTS

Thanks are extended to the staff of the Department of Lands and Forests at Maple, Angus and Downsview and to the Agricultural Representatives' offices of North and South Simcoe for their help during the performance of the survey and the writing of this report, and to the Honourable E. C. Drury of Crown Hill, Ontario, for information on the forest history of the area.

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## INTRODUCTION

The Conservation Authorities Act, passed in 1946, was based on three premises: (1) that since water is the most important of the renewable natural resources, the most logical area on which to co-ordinate conservation work is a watershed or a group of watersheds; (2) that the initiative must come from the local people; and (3) that, if the local people establish a Conservation Authority and are prepared to carry out a program of conservation, they can receive considerable assistance from the Ontario Government in the form of technical advice and grants. With the advent of this concept of personal and community responsibility in conservation, the Conservation Authorities movement was born, and the willingness of our people to undertake conservation in this way is indicated by the fact that in the past eighteen years 32 Authorities have been established, with a total membership of 468 municipalities and an area of 21,952 square miles.

The first step in establishing a Conservation Authority is undertaken by all the municipalities wholly or partly within a watershed. Two such municipalities must first by resolution petition the Government to call a meeting for the purpose of ascertaining whether or not an Authority should be established. Two-thirds of the number of representatives which the municipalities are entitled to appoint (on a population basis) must be present to make the meeting legal. If two-thirds of those present vote in favour of establishing an Authority a resolution is forwarded to the Government. The Authority is then established by Order-in-Council and under the Act becomes a body corporate, including representatives from all the municipalities in the watershed.

While some Authorities were brought into being because of flooding within their areas, all were aware of the necessity of carrying out such supplementary measures as improved methods of land use, reforestation, proper woodlot management, prevention of pollution, investigation of underground water supplies, wildlife studies and recreation. But the Authorities are not equipped to carry out the extensive investigations that would indicate where such work should be done. Consequently the Conservation Authorities Branch of the Department of Energy and Resources Management undertakes to carry out the preliminary investigations as a service to the Authorities, to appraise, by means of surveys and reports, the conservation needs of each watershed, and to submit to the Authority a detailed report outlining the conservation measures that should be implemented.

Surveys may include work in five general fields, namely Land, Forest, Water, Wildlife and Recreation. The scope of the studies made in each of these subjects varies with the condition and needs of the area under investigation.

The starting point for all surveys is aerial photography. Before the survey is commenced in the field all such contributing data as maps, old records, photographs, unpublished reports and other useful information are thoroughly explored and recorded. While the survey is in progress similar data are gathered locally. Agricultural representatives, zone foresters, municipal clerks and other officials and private citizens are interviewed for additional material.

The results of these conservation surveys, together with the recommendations based upon them, are set down in the reports presented to the Authorities and intended to serve them as a blueprint. The carrying out of any scheme is not the work of the Conservation Authorities Branch of the Department of Energy and Resources Management, because it is not an operating Branch, although it stands by to interpret the report and give advice and assistance in carrying out the plans recommended in the report.

The Authority must assume responsibility for initiating the schemes which it considers most urgent; it must also make approaches to the government departments or other bodies from which it hopes to get assistance. If, for example, an Authority undertakes a scheme having to do with land use, it must seek assistance from the Department of Agriculture; if it involves a forestry or wildlife problem, then branches of the Department of Lands and Forests are approached. In the case of flood control, however, as there is no department of the Government doing hydraulic surveys except the Conservation Authorities Branch, whose staff is not large enough to carry through the engineering works of several Authorities, the Authority must engage a consulting engineer to do the final engineering and designing and to carry the work through the construction stage. Similarly, where an Authority undertakes a scheme which has to do with recreation, it may have to employ men specially trained in this work.

As the work being done by Authorities is a new approach to the conservation problem, in that the responsibility of carrying it out is left entirely in the hands of the Authority concerned, much direction and assistance have been necessary from the Conservation Authorities Branch and, in the case of 27 Authorities, including the Nottawasaga, a member of the staff of the Department of Energy and Resources Management has been assigned to work in the watershed.

The Nottawasaga Valley Conservation Authority was established by Order-in-Council on May 5, 1960, following an organization meeting which was held at Barrie on September 9, 1959, when 26 of the 29 municipal representatives were present and 18 voted in favour of establishing the Authority.

Following the formation of the Authority, surveys have been carried out as staff became available and the present report covers the fields of Land, Forest, Wildlife and Recreation.

A.S.L. BARNES

# RECOMMENDATIONS

RECOMMENDATIONS

STATED OR IMPLIED IN THIS REPORT

Land

1. That, since forestry is a function of a land use program, and since forestry and agriculture are both concerned with the use and management of private land, the Authority consider one Land Use and Forestry Advisory Board. (Page 68)

2. That the Authority promote interest in improved soil management practices by giving limited financial assistance in the form of grants toward construction of grass waterways, gully and erosion control, drainage outlets and other approved practices. (Page 68)

3. That the Authority demonstrate various practices such as reforestation, gully control, grass waterways, pasture renovation and improvement, farm ponds and streambank erosion control. (Page 68)

4. That the Authority encourage land-judging competitions by giving financial assistance to local Junior Farm and 4-H Club organizations through the Department of Agriculture. (Page 69)

5. That the Authority encourage streambank erosion control by undertaking demonstrations on Authority land, or by assisting private landowners with demonstration projects. (Page 69)

6. That the Authority promote interest in good land use practices by tours, exhibits, publications and field days. (Page 69)

7. That the Authority co-operate extensively with all local farm organizations to promote and advance interest in conservation and good land use management. (Page 69)

8. That the Authority appoint the Agricultural Representatives and the District Forester in the Lake Simcoe District, Department of Lands and Forests, or their representatives, to be members of the appropriate Authority Advisory Boards. (Page 69)

9. That the Authority bring to the attention of the appropriate municipal officials the serious source of erosion that exists in new construction projects, and request that some effort be made to stabilize and grow cover on newly graded banks and ditches. (Page 41)

<u>Forest</u>

10. That the Nottawasaga Valley Conservation Authority Forest be established and that it be expanded through a continuous program of annual additions and planting until the Authority has acquired as much as is feasible of the 159,047 acres of land designated as best suited for permanent forest cover. (Page 31)

11. That the Authority promote schemes to rehabilitate lands either presently covered with scrub tree species or being invaded by them. (Pages 18, 33, 35)

12. That the Authority adopt the principle of removing trees on the immediate banks of the Nottawasaga River in the Minesing Swamp as a preliminary bank erosion control scheme, with these trees being replaced by smaller tree, shrub or herbaceous species that are more resistant to ice and flood damage. (Page 23)

13. That a policy of aiding landowners to reforest marginal land be established by the Authority, to include furnishing a tree-planting service on private lands unsuitable for agriculture and particularly on areas where erosion control or streambank control are essential. (Page 39)

14. That the Authority utilize areas in the Authority Forest to demonstrate better forestry practices. (Page 42)

15. That the Authority promote the adoption of a tree-cutting by-law for Simcoe County. (Page 27)

16. That the Authority, by purchase of equipment, organization of cutting crews, or direct subsidy, encourage private owners in thinnings and improvement cuttings in their woodlots and in the improved utilization of woodlot products. (Page 42)

17. That the Authority encourage property owners to prevent woodlot grazing. (Page 46)

18. That the Authority co-operate with schools, government departments and all other groups and agencies possible to publicize the need and the methods of reforestation and woodlot management; and in particular that the Authority sponsor tours, practical demonstrations and field days for this purpose. (Page 39)

19. That the Authority encourage and co-operate in research on the best methods of establishing and managing woodlands under local conditions. (Page 46)

20. That the Authority act as co-sponsor for:
    (a) 4-H Forestry Clubs,
    (b) the Tree Farm Movement. (Page 30)

21. That the Authority assist in investigating and publicizing markets and marketing methods for woodlot products to encourage
    (a) maximum use of low-grade materials from thinnings and improvement cuttings, (Pages 42, 57)
    (b) closer and more uniform appraisal of timber, whether standing or in the log, (Page 58)
    (c) marking of trees for removal, (Page 61)
    (d) securing of competitive bids for timber, (Page 64)
    (e) insistence on a written Timber Sales Contract such as the one suggested in this report, (Page 61)
    (f) improved marketing methods or organizations, including co-operatives, which will increase the owner's interest in better management by securing him a greater return for his woodland products. (Page 67)

22. That the Authority investigate and urge the implementation of the best method of providing protection for wooded areas within the Authority from fire, insects and disease, in co-operation with the Department of Lands and Forests. (Page 47)

23. That the Authority encourage the establishment of windbreaks, shelterbelts and snow fences and also investigations into their improvement, placement and design. (Page 51)

Wildlife

24. That the Authority negotiate easements on various trout streams for public fishing. (Page 13)

25. That the Authority encourage landowners to construct trout ponds on streams in the manner described in the report. (Page 15)

26. That the Authority urge the limiting of brook trout stocking to those waters which are shown in this survey to be suitable for brook trout, and which can be proved to have present populations below the carrying capacity of the stream, apart from waters used for early put-and-take fishing. (Page 19)

27. That the Authority encourage the improvement of both publicly owned and privately owned streams for fish by the vegetative and structural methods described in the report. (Pages 20-22)

28. That the Authority improve for wildlife, lands which it acquires, using the methods described. (Pages 25-27)

29. That the Authority urge the restriction of poisoning of roadside vegetation in the valley to those areas where it is absolutely necessary. (Page 27)

30. That the Authority construct one or more ponds to demonstrate approved methods of fish management. (Page 28)

31. That the Authority take steps to protect the heronry in the Minesing Swamp. (Page 35)

32. That the Authority make all possible efforts to acquire the key sections of the Minesing Swamp as a natural water impoundment area and for the management of fish, game and other species of wildlife. (Page 35)

Recreation

33. That the Authority publicize the contribution which all owners of land on the route of the Bruce Trail can make to the development of the trail. (Page 8)

34. That the Authority continue its policy of removing the "dead-heads" in the navigable parts of the Nottawasaga River, and that the Authority examine the feasibility of cutting down those trees which are in danger of falling into the river. (Page 9)

35. That the Authority co-operate with the Provincial Department of Highways, and with the counties and townships involved, in the establishment of roadside picnic sites. (Page 9)

36. That the Authority consider the possibility of acquiring the following proposed Conservation Areas:-

    (a) Scott's Falls Conservation Area (Pages 10-11)
    (b) Mono Cliffs Conservation Area (Page 11)
    (c) Essa Bluffs Conservation Area (Page 12-13)
    (d) Thompsonville Conservation Area (Page 13)
    (e) Singhampton Conservation Area (Pages 13-14)

37. That the Authority discuss with officers of the Canadian National Railways the future of the proposed Colwell Conservation Area. (Page 14)

38. That the Authority acquire a parking site and develop a scenic lookout in the Pretty River Valley. (Page 15)

39. That the Authority consider the possibilities of the future restoration of the dam at New Lowell. (Page 15)

40. That an examination of the spillway at the Tottenham Pond be made, and that the pond and the land surrounding it be acquired and controlled by the Authority. (Page 15)

LAND

# CHAPTER 1

## THE LAND AS A RESOURCE

### 1. Land Use and Conservation

Conservation has been defined in many ways. "The wise use of land and its resources" and "the use of the land in such a way as to give the most benefit to the greatest number of people for the longest period of time" are but two of the definitions.

Conservation and management of land and its resources are synonymous. They both deal with the concepts of land management and the resources the land provides beneath its surface and on it. These land resources include the soil which produces our food and fibre and timber as well as the water that runs over, off or through the land or that lies on it. The land resource is the space that we need to live in - space to build cities and towns, to lay out highways and airports, and space to use for recreation. In many parts of the country there is increasing competition for the limited land resource. Conservation may involve consideration of all the competing demands on land resources and the allocation of land to fulfil these needs. How we allocate the limited land resources may hold the key to the future economic and social well-being of our country.

In rapidly growing Ontario the demands for land to meet many human needs are all increasing rapidly. All too often it is the best agricultural land that is in most demand for other purposes. When some of the better agricultural land is taken for other uses, it increases the need to conserve and improve lands elsewhere that will remain agricultural. This is particularly true when that land has a lower agricultural capability.

Decisions on the "best" use of land are not easy to make. Such decisions involve private landowners, public bodies and governments.

Landowners must make decisions about the use of their own land. If the landowner is a farmer, he must decide what kinds of crops to grow, what rotations to use, and how his soil will respond best to fertilizers. Sometimes a decision must be made whether to use land for agriculture at all, or whether it should be put into forest cover, or sold for non-agricultural uses. Such decisions are usually dictated or at least influenced by economic considerations.

Competing demands for the use of land necessitate many decisions involving land use being made by public bodies - planning boards, municipal councils

and provincial and federal governments and their agencies. Decisions at a municipal level may include official plans and zoning by-laws governing the use of land.

Actions of governments and their agencies have many direct and indirect effects on the use of land. Locations of highways and airfields may have direct long-range influence. Government purchases for provincial and national park sites, for government buildings and defence installations may completely change the land use patterns of an area. Government policies towards the agricultural industry itself have a strong influence on the use of land.

Effective land use practices and policies, whether on an individual or community or municipal or watershed basis, cannot be based on the physical characteristics of land alone. Land use policies must also be concerned with social and economic aspects of an area. Sometimes one or both of these are more important than the physical.

## 2. Land Resource Problems

### (a) Physical

Before man came to this continent, nature had developed her own best uses for the land. White pine grew on the sand plains, hardwoods on heavier soils, cedar and elm in the swamps. Each different soil was producing the kind of growth it was most capable of producing under existing natural conditions.

As swamps dried up new kinds of vegetation appeared. The original forests were replaced with new kinds of trees because the soil's capability to produce had changed.

When man started to use the soil resources of this country, he was not concerned with their conservation. He had little knowledge or experience of the destructive forces of nature in the new world. He had to wrest a living from the land with the simple implements at his disposal and with a great deal of hard labour.

The early settler had no information on the potential capability of the land. This he had to find out by his own experience and observation. We should not now blame our forefathers for their mistakes in the use and management of the land as they were faced with it. Indeed, all too often later generations have failed to profit from their earlier experiences.

Slowly we have learned that wise land use must be a combination of land capability and the needs of man. The soils of a district may be well suited to the growing of a particular cash crop but if there is no market for that crop it is useless to grow it.

Basic to any land management program is a knowledge of the physical features and the soil of an area. This knowledge can be obtained from careful observation of the soil and its crop responses. Many farmers have observed and fitted their farming program to the capability of their land. Other farmers, however, have failed to recognize the peculiar needs of their own soils and have made little attempt to maintain or improve them.

The need for basic information on soil has long been recognized. Both federal and provincial governments in Canada are carrying out soil mapping programs. The province has conducted conservation surveys over many watersheds in Ontario. Other detailed soils and land use surveys have been done by municipalities and by universities. In total, a considerable amount of information is available on the physical problems, needs and characteristics of soil and land.

Soil and land use information from surveys serves as a basis for extension programs to encourage better use of the land. Soil survey and conservation reports are available to any landowner who wishes to avail himself of the information. A combination of private initiative and interest, and of government support through teaching, extension and research will bring about desirable changes in land use. Changes, however, must be those required by good land management and by the economic and social conditions of the times.

Soil conservation and land management programs are long-range programs. They require the support of every person and every agency concerned with land.

(b) Economic

The income of any area basically comes from its natural resources which must be available and of use to man. To be economically sound, use of the land and its resources must provide enough income to make the residents financially able to support themselves. In Ontario there are many rural and some urban areas where this is not possible.

Poor areas are usually poor because of insufficient available resources to support the people living there. Sometimes the resources are present but the community lacks capital or knowledge to develop them more fully. Such

situations exist in some parts of this Province. The residents are attempting to secure a living from land that is marginal or sub-marginal for agriculture. The land may be too poor to produce crops and should be returned to forest cover. In some areas farming units are just too small to be economic under present-day agricultural conditions.

In such areas conservation needs may involve a complete change of land use - pasture to forest, or crop land to pasture. Frequently the landowners cannot afford to make such changes. They may not possess the initial capital necessary to effect the change. They may not be able to afford a period of lower income during the changeover. In some situations land uses should be modified to bring about improvement in rural living standards. This modification may involve changes to other types of crops, different cultivation methods, larger farm units, or a complete change in land use.

Taxes, both real estate and income, have a bearing on land use. Low assessment on marginal land that is capable of improvement may encourage its continued marginal use. Income taxes and the distinction presently made between capital gains and income may influence the use of land. This particularly applies to forestry and woodlot management.

To be effective, any Authority program directed towards the use of land and water must consider the overall economics of land use in the area. Farmers, just as all other citizens, are working to make reasonable incomes from their operations. It must be demonstrated that recommended land use changes will maintain or increase their incomes. Some land use and soil-conserving measures which are needed in the watershed may be too expensive to the landowners involved in terms of the immediate expected returns. The public, through a Conservation Authority or other agency, must then help to bear a part of the cost. .

Conservation farming makes economic sense. Hundreds of farmers have proved it; nevertheless, those responsible for programs for soil conservation and land use must always be ready to back up their arguments with facts and figures. If facts to prove the economic value of recommended measures are not available it will be much more difficult to "sell" the conservation ideas to landowners.

(c) Social

The land should provide the farmer with an adequate income. An adequate income should provide among other things a satisfactory standard of living. The use of the land should be suited to the background and experience of the people

concerned. Factors such as the age of the farm operator, his nationality and the opportunities for non-farm employment, all influence the patterns of land use. A farmer who is well past middle age will not normally have the interest or desire to change his farming practices that a younger man will have. This is most often true where there are no sons at home to assist him and eventually take over the land. Age or ill health will prevent a farmer from farming to the best of his ability.

In those parts of Ontario where farmland is marginal for agriculture it will often be found that the age of farm operators averages some years beyond middle age. The younger people, unable to secure what they feel is a reasonable income from these farms, have left to seek other employment. The parents carry on as best they can until death or retirement.

In recent years opportunities for off-the-farm employment have increased greatly in many parts of the Province. This is particularly true around the larger cities and towns which have numerous industries. Members of farm families and often the farm operators themselves have gone to work in urban centres while continuing to live on the farmstead. The farmland itself may be completely abandoned as an agricultural operation or there may be partial or seasonal use of the land in combination with the operator's non-farm employment.

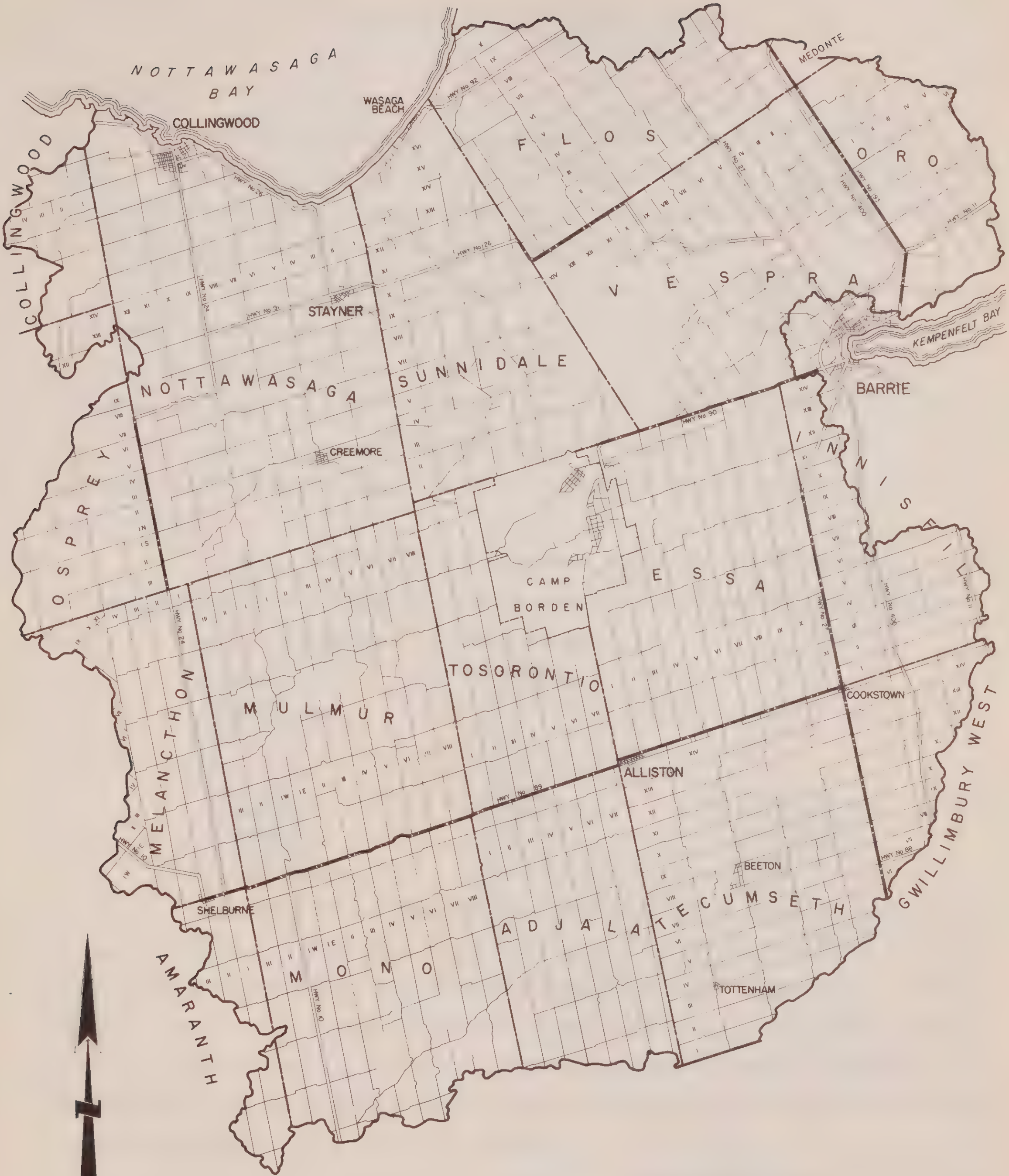
The social pattern of life in the community can be an important means of promoting a conservation program. Most communities have many social organizations - various farm organizations, women's, junior and church groups and service clubs. A Conservation Authority in promoting its program is well advised to work with these existing organizations in reaching the residents.

(d) Political

In our society, government programs can generally be successful only in so far as people want them. This is true whether at national, provincial or local levels. The conservation program, whatever its nature, will be successful only if it is needed and is accepted.

To be effective, local residents must have a voice in conservation programs. This voice is provided through the elections of municipal councils and the councils' appointment of members to the Conservation Authorities. Authority members know the conservation needs and problems of their particular communities. Further local voice is provided for in the appointment of advisory boards to the Authorities. Advisory boards often include members with a special knowledge of land use, recreation, forestry, water or wildlife problems in the area in which they

live. These boards provide opportunity for local people to discuss their problems and to advance their own suggestions and solutions. This is particularly important where land use programs are concerned.

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## CHAPTER 2

## THE NOTTAWASAGA WATERSHED AND AREA

### 1. Location

The Nottawasaga Watershed lies within the counties of Simcoe, Dufferin and Grey; 74 per cent is in Simcoe, 22 per cent in Dufferin and 4 per cent in Grey. The watershed is roughly rectangular in shape. Its north-south dimension averages 38 miles and east-west width 31.5 miles.

The watershed is bounded on the north by the shoreline of Nottawasaga Bay (an arm of Georgian Bay) and the watersheds of the streams flowing directly into Georgian Bay and the Severn River. On the east the watershed is bounded by the drainage areas of the numerous small streams flowing directly into Lake Simcoe, including the Holland Watershed. The Humber and Credit River Watersheds form the south boundary, while on the west lie the Grand, Saugeen and Beaver Rivers.

There are 28 municipalities whose areas are wholly or partly within the jurisdiction of the Nottawasaga Valley Conservation Authority. These are:-

| | | |
|---|---|---|
| The City of Barrie | The Townships of | |
| | Adjala | |
| The Towns of | Amaranth | |
| Alliston | Collingwood | |
| Collingwood | Essa | |
| Stayner | Flos | |
| | Gwillimbury West | |
| The Villages of | Innisfil | Oro |
| Beeton | Medonte | Osprey |
| Cookstown | Melancthon | Sunnidale |
| Creemore | Mono | Tecumseth |
| Shelburne | Mulmur | Tosorontio |
| Wasaga Beach | Nottawasaga | Vespra |

In addition to these incorporated municipalities there are the Police Villages of Angus, Everett, Hornings Mills, Nottawa and Thornton. There are many unincorporated hamlets scattered throughout the watershed. These include Avening, Badjeros, Bondhead, Brentwood, Churchill, Colgan, Craighurst, Crown Hall, Dunedin, Duntroon, Edgar, Glencairn, Glen Cross, Hockley, Honeywood, Lisle, Mansfield, Midhurst, Minesing, Mono Centre, New Lowell, Newton Robinson, Phelpston, Primrose, Rosemont, Singhampton, Terra Nova and Utopia.

The city of Barrie, on the easterly boundary of the watershed (only 10 per cent of the corporation lies within the Authority area) is the main urban focus for the easterly part of Simcoe County and the watershed. Collingwood, in the north-west corner of the watershed, and Orangeville (which lies in the Credit

Watershed) are smaller trading centres. The whole watershed is influenced in many ways by the proximity of Metropolitan Toronto, the northern boundary of which lies less than 20 miles from the southern part of the watershed.

The watershed is well served by highways, with 400, 11 and 27 from Toronto passing through Barrie and continuing to points north. Highways 26 and 89 serve the watershed in an east-west direction and 24 runs north-south through the western part of the watershed. Several rail lines, including the transcontinental Canadian National and Canadian Pacific, cross the watershed. All portions of the area are well served by a grid of county and township roads.

While not a municipality or political unit, the Camp Borden military establishment is an important unit in the watershed. Nearly 36 square miles in area, it is located astride the townships of Tosorontio and Essa and almost exactly in the centre of the Nottawasaga drainage area.

## 2. Geology

Geology is the science which has to do with the origin, composition, structure and history of the earth's crust.

The bedrock of the Nottawasaga Watershed is sedimentary - that is, it is composed of fine materials eroded from an ancient land surface and laid down in water. Through processes of cementation and compaction the sediments became rock. The sedimentary rocks of Southern Ontario were laid down in shallow seas which once covered much of central North America. Such rocks contain certain fossils and animal skeletons which still remain and which may be used to date the age of the rocks. Sedimentary rocks are stratified, or layered, as they are deposited in water. These rocks are classified according to eras, formations and other units on the time scale of millions of years.

In the Nottawasaga Watershed the basement structure of the region consists of flat-lying rocks which were laid down during the Ordivician and Silurian geologic periods. This is estimated to be at least 300 million years ago. The Silurian rocks overlie the earlier Ordivician; the latter rocks contain the Black River and Trenton (limestone and shale) and the Lorraine and Queenston (shale) formations. The Silurian contains the Lockport (dolomites and dolomitic limestone) formations.

After the land masses rose above sea level, erosive forces came into operation, cutting deep valleys. The most significant landscape feature of the watershed is the Niagara escarpment. This escarpment, or cuesta, was in part

caused by differential erosion between the harder and softer rocks. The highly erosion-resistant Lockport cap-rock over the softer Silurian shales is the cliff-forming member of the rocks in the escarpment region. The escarpment is characterized by a steep scarp face on the east and gentle back slope to the west.

Pre-glacial valleys cut deeply into the bedrock. These valleys are now the drainage ways of the Pretty, Mad, Noisy, Pine, Boyne and Nottawasaga Rivers. Consequently, the outline of the escarpment is ragged.

3. Physiography

Nearly all of the present landscape of eastern Canada stems from the activities and movements of the great ice sheets of the glacial ages. Important effects were produced also by meltwater effluents that marked the recession of the ice and the closing stages of the glacial ages. It is to these events that we must look for an understanding of the relief and composition of the landscape and of the soils developing therefrom.

During the past million years Southern Ontario has been covered at least three times by vast sheets of ice. These ice sheets, which once covered great portions of the continent, acted as tremendous forces of deposition and erosion and helped shape our landscape. These glaciers emanated from two principal areas in the north - the Keewatin district and the highlands of Labrador and Quebec. Between the several ice ages were periods when the climate was warm - probably warmer than now - and the land was ice-free.

The last of these glaciers is commonly called the Wisconsin, as its results were first identified in that state. It is responsible for much of our present landscape in north-eastern North America. As this great continental ice sheet moved across the land it acted as a plough; pushing, scraping and grinding the bedrock and moulding and spreading the resultant pulverized material. This conglomerated heterogeneous material is called TILL.

The glacier's retreat from the land was brought about by a warmer climate which caused the ice to melt. One can only imagine the fantastic volumes of water released. These waters, rushing away from the melting face of the glacier, carried with them large amounts of loose rock. As the volume and velocity of water decreased the material was deposited on the bottom of the waterway or strewn along the side. Deposits formed in such a manner are called "glacio-fluvial" ("glacio" referring to the rocks being pushed about by the glacier and "fluvial" to the fact that this material is water-moved).

Rock materials were often carried great distances from their point of origin. The moving ice often gouged out great rock fragments, which, as they were moved along, scraped at the rock floor over which they were carried. Sharp corners and edges of even the hardest rocks were ground smooth by this abrasive action. Thus were formed the rounded, smooth rocks and stones common to glaciated regions and so common in many parts of this province.

In the Nottawasaga area a tongue of the Wisconsin glacier, riding over the present Georgian Bay area, scoured the lip of the Niagara escarpment in overriding it. The limestone plains are evidence of this: The limestone rock is at or near the surface. Elsewhere in the watershed the lack of prominent obstacles precluded glacial erosion and deposited material was the most common factor in shaping our present landforms.

Material accumulated by the ice was left on the ground over which the ice moved and from which the ice front finally retreated. This conglomerated mixture of till is made up of rock, stones, sand, silt and clay (one or more of these materials may predominate in some areas). Such a surface mantle covers much of Canada. Its form is called a MORAINE. Where it forms a level or rolling cover over a plain, it is referred to as a "till plain" or "ground moraine". Where it stands out as a ridge or series of hummocks, it is called a "terminal moraine". This terminology comes from the fact that the ridges of a terminal moraine are perpendicular to the direction of ice movement and hence mark the point of furthest advance of the ice.

Both till plains and till moraines, the primary deposits of glaciation, are found in the Nottawasaga region.

The Nottawasaga Watershed may be divided into a number of physiographic regions. For the purposes of this report these regions will be discussed under the following headings.

(a) <u>The Escarpment</u>

Probably the most prominent landscape feature in Southern Ontario is the Niagara escarpment. It extends from the Niagara frontier to the tip of the Bruce Peninsula. It forms the western edge of the Nottawasaga Watershed. Along most of its length the escarpment is marked by almost vertical cliffs. In this watershed, however, the slopes of the escarpment are often hidden by morainic deposits and, for long stretches, the actual escarpment is difficult to find.

The elevation of the escarpment is generally over 1,600 feet, with many areas exceeding 1,700 feet. One peak near Edward Lake, on the boundary of the watershed, between the Mad and Pretty Rivers, reaches 1,775 feet.

Not a part of the Nottawasaga drainage system, but rather flowing directly into Georgian Bay, are the small streams of the Batteaux and Pretty Rivers and Silver Creek. All these streams flow off the slope of the escarpment through deeply dissected valleys.

The most spectacular part of the escarpment lies above Collingwood. Known as the Blue Mountains, it stands over 1,000 feet above the waters of Georgian Bay. Deep crevices in the rock face above Collingwood have formed "The Caves", a widely known tourist attraction.

While the Niagara escarpment can be described as a product of erosion, the remainder of the major physical features of the area are the result of glacial deposition.

(b) Till (Terminal) Moraines

Terminal moraines are the product of the advances and halts of the ice fronts. These areas of low ridges of till material are to be found in several parts of the watershed. The Singhampton moraine extends from Caledon to Singhampton along the brow of the escarpment. It shows up most prominently near the village of Primrose. The Gibraltar moraine, starting at Chesley in Bruce County, runs east through Grey County. Its ridges are closely associated with the escarpment and are often difficult to distinguish from it. Terraces of sand and gravel of this moraine are common in Mono Township.

The Banks moraine is located on the crest of the escarpment and may be found in a sharp-angled bend at the village of Banks. A section of the moraine forms a semi-circular barrier in the Pretty River valley. It passes west of Duntroon to Glen Huron and Dunedin and finally disappears into the interlobate moraine south of Hockley.

Running diagonally across the Township of Nottawasaga is a broad ridge called the Corn Hill moraine. Seeming to emerge from the base of the escarpment, it disappears west of Sunnidale Station.

Between the Minesing flats and Jack Lake, and running through the second and third concessions of the Township of Flos, is a ridge of clay spread over with sand which is called the Edenvale moraine. The Nottawasaga River has cut a 90-foot gorge through it.

The Oak Ridges moraine vies with the Niagara escarpment as a distinctive land feature of Southern Ontario. This ridge, or height of land, begins at the Niagara escarpment and runs in an easterly direction to the Trent River, south of Rice Lake. It forms the divide between the drainage south into Lake Ontario and that north into Georgian Bay, Lake Simcoe and the lakes and rivers of the Trent drainage system. This moraine forms the height of land between the Nottawasaga and the Humber and Credit drainage systems. The surface of the Oak Ridges moraine is knobby and hilly, with elevations reaching 1,400 feet. Generally the soil materials are sandy or gravelly, at least on this watershed. While the moraine gives rise to numerous streams at its base, there are few flowing from the ridge itself. The lack of streams tends to restrict the land uses of the moraine.

North of Barrie there is a broad, sandy ridge called the Oro moraine, or Oro sand-hills. They extend from near Midhurst through the northern part of Oro Township to Bass Lake. These sandy hills are the highest land to be found in the north-east part of the watershed.

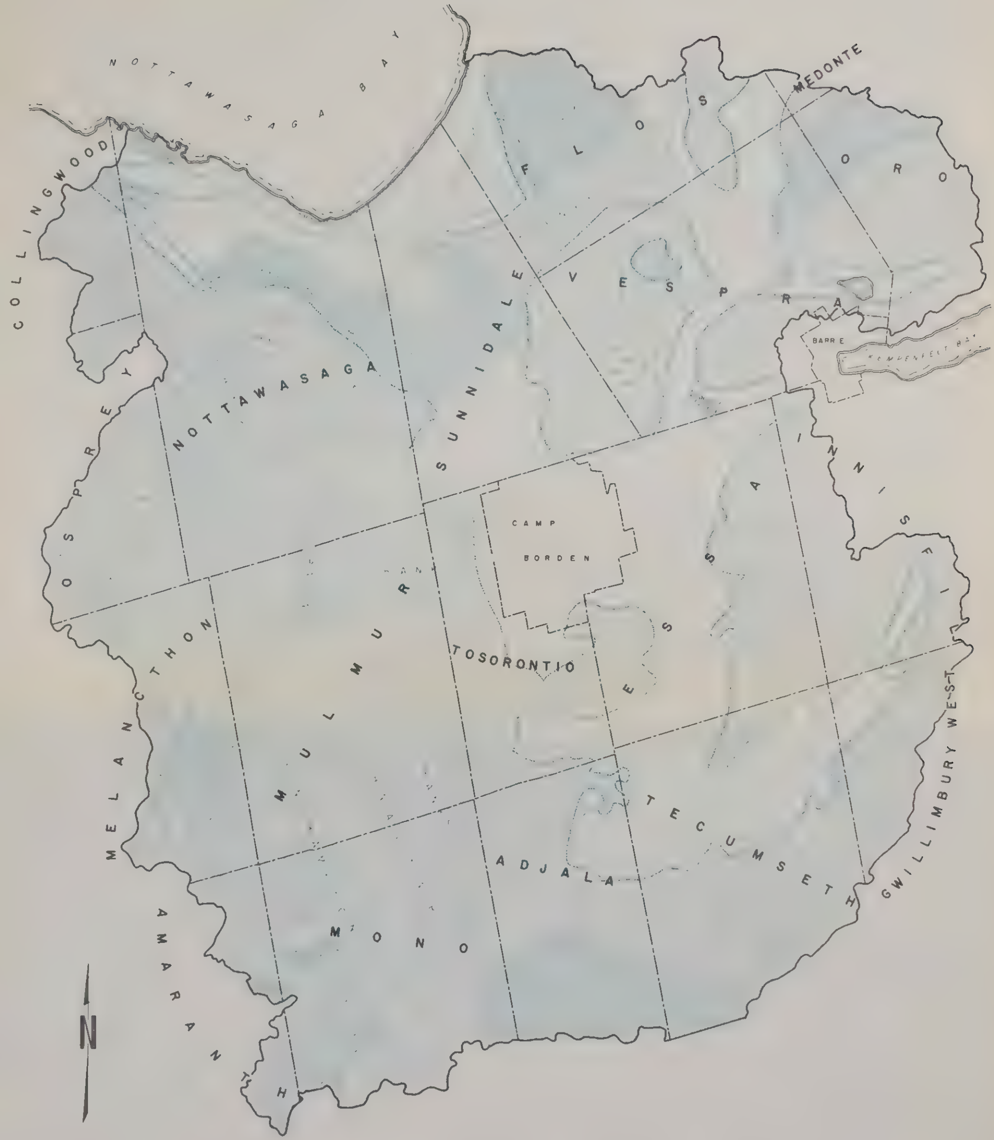
Both the Oak Ridges moraine and the Oro moraine are "interlobate" - that is, they are believed to have been formed between the lobes of the glacier with some sorting of material by water flowing out from the ice and depositing sand as it flowed.

(c) Spillways

Glacial drainage, escaping from the ice front, carved broad troughs in the landscape. Some of those ancient spillways are now occupied by streams and some are not. Several of the tributaries of the Nottawasaga, for example the Mad River, occupy these glacial channels as they flow from the escarpment and the associated highlands of the moraine.

(d) Glacial Lacustrine Features

More than half of Southern Ontario was submerged at one time following the retreat of the last glacier. Water flowing from the melting glaciers on the surrounding higher lands brought down large quantities of soil material. These water-laid sediments remained as areas of generally stone-free, level land. Several arms of these water-laid lake plains can be seen in this watershed. Glacial rivers flowing through the spillways mentioned in the preceding paragraph brought down the soil material. Some of the lacustrine material was also moved into the water by the constant action of the waves on the shores of the glacial lakes.




LEGEND

| | | |
|---|---|---|
| TILL PLAIN | CLAY PLAIN | SAND PLAIN |
| TILL MORAINE (OVERPRINT OF NAMES) | KAME MORAINE | LIMESTONE PLAIN |
| BEVELLED TILL PLAIN | SPILLWAY | ESCARPMENT |
| BOG OR MARSH | BEACH & SHORECLIFF | |

# PHYSIOGRAPHY

BASED ON CHAPMAN & PUTNAM
"THE PHYSIOGRAPHY OF SOUTHERN ONTARIO"

SCALE · MILES

L & F CONSERVATION AUTHORITIES BRANCH 1963

A predecessor to some of the present water bodies of the upper Great Lakes system was glacial Lake Algonquin. This lake once inundated an area of over 1,200 square miles, including a part of the present Nottawasaga Watershed. Many stretches of the shoreline of Lake Algonquin are still visible - near Stayner, about five miles east of Creemore, and north of Everett. The Canadian Pacific Railway follows the ancient shoreline from below Essa to Midhurst.

A later stage of glacial Lake Algonquin has been called Lake Nipissing. This lake's old shoreline can be clearly traced around Georgian Bay east of Collingwood. It is well marked at about 50 feet above the existing shoreline of Georgian Bay. The strip of land that lies between this ancient shoreline and the present one is stony and wet. Immediately west of Collingwood the 15-foot-high Lake Nipissing shoreline is clearly seen just to the south of Highway 26.

Most of the low-lying land in the Nottawasaga Watershed once inundated by Lake Algonquin is now described as the Simcoe lowlands. The soils are heavy and usually poorly drained or else are sandy. One of the areas of the Simcoe lowlands, called the Minesing flats, is an extensive area of loams and silty clay loams with some deposits of marly material. The Minesing swamp is a part of these flats; it is undrained and filled with muck deposits of varying depth.

The Stayner clay plain is made up of deposits of poorly drained Parkhill loam and imperfectly drained Alliston sandy loam and Smithfield clay loam. There are scattered shallow patches of sand mixed with the heavier soils. To the north-east of Jack Lake there is the Elmvale clay plain. Here the soils are also usually poorly drained and sometimes stony.

Associated with the clay plains in the Simcoe lowlands are extensive areas of sandy soils. The Tecumseth flats are characterized by deep beds of sand and silt. Drainage on these flats is generally poor and there are several bogs. One of these bogs (the Innisfil Swamp) is at the head of Innisfil Creek, another in the eleventh and twelfth concessions of Tecumseth, one mile east of Highway 27, and a third on the Tecumseth-Adjala townline, two miles west of Beeton on Bailey Creek.

The Essa flats and the Camp Borden sand plains are better drained. These sands were washed down into glacial Lake Algonquin by the Pine and Mad Rivers, which flowed down from the Niagara escarpment. The sands around Camp Borden are coarse and droughty. They are generally poor for agriculture and subject to erosion. Much of the sand plains has been reforested.

The Essa flats are more fertile. The sands and sandy loams around Alliston are extensively used for potato- and tobacco-growing.

4. Hydrography

The main branch of the Nottawasaga River is about 75 miles in length. It rises in the south-west end of the watershed, below Shelburne, at an elevation of 1,590 feet, and flows on a roundabout course to empty into Georgian Bay at Wasaga Beach. It falls some 1,010 feet, at an average of 13 feet to the mile. The main branch of the Nottawasaga drains an area of 158 square miles.

There are many tributaries to the river, the Pine and the Mad being the major ones. They both flow from the top of the escarpment and have drainage areas of 134 and 98 square miles respectively. Both of these tributaries as well as the main river have very steep gradients as they come down the escarpment - gradients sometimes exceeding 100 feet to the mile. The Nottawasaga itself flows through Hockley Valley, while the Mad has a deep-cut valley known as "Devil's Glen".

Other tributaries and their drainage areas include Shelburne Creek (36 square miles), the Boyne (94 square miles) and the Noisy (40 square miles). These tributaries flow off or from the base of the escarpment. Innisfil Creek (68 square miles) flows through the Essa flats, and Penville Creek drains 33 square miles around Bondhead and Newton Robinson. Lamont Creek has a drainage area of 46 square miles in the Stayner flats. There are numerous other smaller and unnamed tributaries.

In addition to the drainage system of the Nottawasaga, several other adjacent streams which flow directly into Georgian Bay are included in the jurisdiction of the Nottawasaga Valley Conservation Authority. These include the Batteaux, Pretty, Silver and Underwood Creeks in the Collingwood area.

5. Climate*

Proximity to the large water body of Georgian Bay influences the climate of part of the watershed, serving to moderate it. Sufficient difference in climate exists between the Georgian Bay shoreline and the much larger hinterland to warrant discussion of each separately.

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* Putnam D.F and Chapman, L.J. The Climate of Southern Ontario, Sci. Agric. 18:8, April 1958.

(a) Georgian Bay Shore Area

| | |
|---|---|
| Average date on which growing season begins | April 19 |
| Average date on which growing season ends | November 1 |
| Average length of growing season | 196 days |
| Average date of last spring frost | May 15 |
| Average date of first fall frost | October 8 |
| Average length of frost-free season | 147 days |
| Mean monthly temperature - February | 18°F |
| - July | 68°F |
| Lowest temperature recorded at Collingwood | -30°F |
| Highest temperature recorded at Collingwood | 102°F |
| Average annual precipitation | 29 inches |
| Average annual snowfall | 80 inches |
| Average precipitation for period June-July-August | 8 inches |

In 30 years out of a 50-year record period, one or more months in the May-September period have had less than 1 inch of rainfall.

The moderating effect of Georgian Bay on the climate makes possible, to a large degree, the extensive apple orchards in the Collingwood area. The water body helps keep early spring temperatures low, thus retarding growth until frost danger is largely past. It also provides a warming influence in fall, delaying early frost until crops are mature and well coloured. Winter temperatures, as well, are kept above the extreme of the townships further south.

(b) Nottawasaga Hinterland

The moderating effects of the waters of Georgian Bay are dissipated a very few miles away from the shoreline. Lake Simcoe has little, if any, moderating effect as it is too small and shallow.

Some significant climatic data for the larger area of the watershed beyond the influence of Georgian Bay are as follows:

| | |
|---|---|
| Average date on which growing season begins | April 15 |
| Average date on which growing season ends | October 25 |
| Average length of growing season | 194 days |
| Average date of last spring frost | May 22 |
| Average date of first fall | Sept. 25 |
| Average length of frost-free season | 126-132 days |
| Mean monthly temperatures - February | 15° - 16°F |
| - July | 66° - 67°F |
| Lowest temperature on record | -42°F |
| Highest temperature on record | 104°F |
| Average annual precipitation | 28-30 inches |
| Average annual snowfall | 60-100 inches |
| Average precipitation for the period of June, July, and August | 8 inches |

In 20 years out of a 50-year record period, one or more months in the period May to September had less than 1 inch of rainfall.

The escarpment near Collingwood.

A spectacular rock formation on the face of the escarpment near the Collingwood caves.

CHAPTER 3

## SOILS: THEIR CHARACTER AND CAPABILITIES

### 1. Formation of Soil

Soils are developed largely from broken rock and mineral material. Close examination of soil shows it to be made up of many particles. These particles may vary in size from microscopic in clay and silt soils to the granular particles of sand and may also include small stones and gravel.

The processes of soil formation are partly mechanical and partly chemical. In most of the north half of this continent soil formation was started as a result of glacial action. The rock material was moved about by the ice and ground into small pieces. These pieces were transported by the ice itself or in the vast quantities of water flowing from the ice. The breakdown of rock was completed by various weathering agents - sun and wind, rain and frost, heat and cold.

There are many kinds of soil. The wide variation in soil has been caused by many factors including the different kinds of rock material and the variations in topography and drainage conditions during the soil-formative processes. In the later stages of soil development, the natural cover, whether of grass or trees, and the amounts of rainfall, sunshine and frost had great influence on soil development.

The processes of soil formation have taken thousands of years. In the later stages, plant and animal life appeared. The death and decay of plant and animal material produced organic matter or humus. This became gradually mixed with the top few inches of the soil. All soils are made up of solid inorganic mineral material, dead organic matter, water, soluble chemical salts and air. The differences in the proportion of these elements in any soil gives the soil its character. These differences are expressed in a soil's qualities and its ability to support life.

Most soils are made up of layers. These layers are called horizons. Taken together these horizons are called the soil profile. The soil profile can be described as a vertical cross-section cut to the weathered and unaltered material from which the soil was formed. Every soil has a profile. The nature of the profile has a lot to do with root growth, moisture storage and the supply of plant nutrients. Examination of a soil profile is basic to a scientific study of the

soil; its examination tells the story of the centuries of development behind that particular soil.

Such influences as type of bedrock, slope, drainage, climate and kind of vegetation influence the formation of a soil profile. The layers of the profile may be thick or thin and their colour may vary.

For the purpose of easy description, soil horizons have been given letters, "A", "B" and "C". Some soils may lack one or more horizons and the main horizons may be further sub-divided into "$A_1$", "$A_2$", etc.

The "A" horizon is the uppermost layer of the profile and is the surface of topsoil. Life is most abundant in this layer and it contains most of the organic matter. Immediately below the "A" horizon is a "B", commonly called the subsoil. It has less life - plant roots, bacteria, etc. - than the topsoil or "A" layer.

The "C" horizon is the deepest one. It contains the upper part of the loose and partly decayed rock material from which the "A" and "B" horizons have been formed. The "C" horizon is therefore often called the parent material of the soil.

Soils have many differences which may be local within a field or farm or may be regional. The differences are the basis of soil study and soil classification.

Soils can be identified, named and classified just as can plants and animals. In plants such characteristics as leaf and flower parts are used for identification. In soils such factors as texture, stoniness, colour, number and depth of horizons, drainage and topography are used to identify, name and map them.

Many of the characteristics of soils are derived from the size of individual soil particles. Particle size determines soil texture, i.e. whether a soil is sand, silt or clay. Some soils consist entirely of sands, others of clay, and there are many intermediate mixtures - as for example, clay loams, sandy loams and silty clay loams.

In the mapping of soils they are given the name of a place near which they were first identified. Thus we have, for example, Alliston sandy loam and Bondhead loam in the Nottawasaga Watershed. In Alliston sandy loam, the "sandy loam" refers to the texture of the topsoil and Alliston is the place nearest to which it was first mapped. All soils with the name Alliston have a certain specific range of all characteristics - colour, depth of layers, etc. The topsoil

textures may vary, however, and we have, for example, Alliston sandy loam and Alliston fine sandy loam. The loams and fine sandy loams of the Alliston soils are together called the Alliston series. The series is a main unit of soil classification. Within each series there may be several types, e.g. sandy loam.

Soils may have developed from similar parent material but have been subjected to different drainage conditions during their formation. Drainage condition as well as the amount of slope greatly influenced their development and their profiles. Differentiation on this basis is called a catena. Thus we may have well drained, imperfectly drained or poorly drained soils developed from the same parent material. A soil catena receives its name from the well drained member of the catena.

The flow of waters as the glaciers receded produced large deposits of outwash sands in parts of the watershed (see Physiography). On this material, extensive areas of Tioga soil have been formed. The Tioga catena has as its members the well-drained Tioga series, the imperfectly drained Alliston series and the poorly drained Granby series. Each series is divided into several types. As mentioned, the Alliston series has two types, sandy loam and fine sandy loam.

Surveys of the soils based on the above units have been carried out through most of agricultural southern Ontario. Soil surveys are done on a county basis. They are done co-operatively by the Soil Research Institute of the Canada Department of Agriculture and the Soil Science Department of the Ontario Agricultural College.

A soil survey includes fairly detailed examination of all the soils of the county. Boundaries are mapped and the soils described. The results are published as a county soil report. These reports consist of descriptions of the soils together with suggestions for their use and management. Each report is accompanied by a map showing location and distribution of each soil within the county.

## 2. Major Soils of the Nottawasaga Watershed*

### Tioga Series

This series is the most common in the watershed. It has developed from outwash sands. Usually stone-free, there are, however, several areas where

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* This section is based on the Soil Survey of Simcoe County, Report No. 29, and the Soil Survey of Grey County, Report No. 16, prepared by the Research Branch, Canada Department of Agriculture, and the Ontario Agricultural College.

Tioga is rather stony. The topography is, with a few exceptions, gently undulating with long smooth slopes. The series is well drained, low in moisture-holding capacity and rather low in natural fertility. This low natural fertility often demands the growing of a high-value cash crop to pay for the cost of fertilizing.

A wide range of cash crops is grown on the Tioga series. In the Alliston area around New Lowell, tobacco is the main cash crop. On the soils around Collingwood, tender fruits and vegetables are widely grown. A considerable acreage of potatoes is grown on Tioga soils near Alliston. Large acreages of Tioga soils are used for general mixed farming. However, without heavy fertilizing, yields of grain and hay crops are low. Many of the pasture fields are weedy and filled with low-quality grasses. It is recommended that where Tioga soils cannot be used for relatively high-value cash crops, their best use is in the growing of trees.

Tioga soils are susceptible to damage by wind erosion. Wind erosion has often been severe in the tobacco-growing areas where the soil cover is sparse over a large part of the year. Greater use of windbreaks or strip-cropping should be considered in order to reduce the loss of soil.

### Alliston Series

The Alliston series is found in association with the Tioga soils and is the imperfectly drained member of the Tioga catena. It is often found on the more level parts of the sandy outwash plains. The Alliston series is common in the townships of Nottawasaga, Tecumseth, Sunnidale and Tosorontio. The soils are level to very gently undulating in topography and generally stone-free.

The imperfectly drained nature of Alliston soils limits their use for cash crops. They are more often found under mixed farming. A much wider range of crops including cash crops can be grown when Alliston soils are artificially drained with tile. The soil has low natural fertility and fertilizer applications are necessary for effective crop response. Lime may be required, particularly where legumes are grown.

### Granby Series

Associated with Tioga and Alliston soils is the poorly drained member of the catena, the Granby series. Generally found as sandy loam and fine sandy loam, poor drainage means that few of the Granby soils are cultivated. They are covered with trees and brush and often stay wet a large part of the year. Their best use is for wildlife areas, woodland and water reservoirs; in very few cases should artificial drainage be considered for Granby soils.

Vasey Series

This soil is rather widely distributed in several parts of the watershed. Its topography is variable but includes some rather steep areas where cultivation may be difficult because of the slope. Vasey soils are developed from till material and are well drained. Some areas of Vasey are quite stony. Erosion can be serious on the steeper slopes, which should be kept under tree cover.

The Vasey soils are used for general farming. In prolonged dry periods the soil dries out and plants suffer for lack of moisture. Manure is essential to help maintain the fertility and to increase the humus content and moisture-holding capacity of the surface soil. Nitrogen fertilizers are necessary on fields which have not received manure and have not been growing legumes. Good management practices for Vasey soils include measures to control sheet erosion.

Bondhead Series

The Bondhead series is common in the south-west part of the watershed near the village of that name. Developed from till material, this soil is well drained with smooth to moderately sloping topography. The surface soil may be slightly stony. Erosion can be serious on the steeper slopes.

Bondhead soils can be used for most types of farming but dairy and mixed farming are most common. All the crops grown in support of the livestock industry produce good yields on this soil. Additions of barnyard and green manures increase its moisture-holding capacity and improve the tilth.

Schomberg Series

This soil is found mostly in West Gwillimbury and Tecumseth Townships. It is "lacustrine" in origin, i.e. it was laid down in water and owes its origin to glacial Lake Schomberg. Schomberg soils are developed from deep deposits of clay and silt loam. In topography they are moderately to steeply rolling with short slopes. They are well drained, generally stone-free, and with silt loam surface textures.

Schomberg soils are one of the best fine-textured soils in Ontario. They are largely devoted to mixed farming with emphasis on grain. An extensive acreage of winter wheat is grown and dairy herds are common.

Erosion is a problem on Schomberg soils. It can best be controlled by keeping the steeper slopes in grassland, or using contour cultivation. Grass waterways should be used where necessary to control runoff and gully erosion.

Tioga-Vasey Complex

In certain areas two or more soils occur in close association and in patches too small to map separately. Such areas are called soil complexes and are given the names of the principal soil occurring in them. One such complex in the Nottawasaga watershed is Tioga loamy sand - Vasey sandy loam. It is found scattered through Essa, Vespra, Oro and Flos Townships.

It has rugged topography with steep slopes. Stones are numerous. Nearly half of this soil complex has been reforested. The remainder is in mixed farming with tobacco in some small, well drained, sandy areas.

Honeywood Series

The well drained Honeywood series occurs commonly in Mulmur and Melancthon Townships. The topography is gently undulating with good external drainage. Except for a few field stones, the soil is stone-free. Soil texture is silt or sandy loam. The surface is friable and easily worked, well drained but with good moisture-holding capacity in dry periods.

Honeywood soils are among the best agricultural soils in Southern Ontario. They are capable of producing any crop climatically suited to the area. Large acreages of potatoes are grown in the vicinity of the hamlets of Honeywood and Redickville.

Hillsburgh Series

A considerable area of this series is found in the part of Dufferin County drained by the Nottawasaga. Characterized by rough topography, often with steep slopes, the soil is a sand or sandy loam texture over coarse stony till. Susceptible to wind erosion, this soil has suffered severely from erosion in some areas.

Hillsburgh soils are used for general farming and are recognized as good potato soils. The steeper slopes should be kept in tree cover.

Osprey Series

Areas of this soil are found in Osprey and Collingwood Townships and in scattered areas in Mulmur and Mono. It is well drained loam with irregular, steeply sloping topography and usually stony.

Stoniness and steep slopes hinder cultivation of Osprey soils, and they are used mostly for grazing. They are low in fertility and large amounts of manure should be used if cultivated. All steeper slopes should remain in tree cover.

Sargent Series

Found mostly in Vespra and Oro Townships, it has a smooth to gently sloping topography with some steep phases. It is a droughty soil, low in fertility and used mostly for pasture. Steeper slopes need reforestation.

Harriston Series

Well drained, moderately stony loam and silt loam, this soil is found in the escarpment area. The topography is moderately rolling with irregular steep slopes along the streams. The land is used in the production of general farm crops. Generous amounts of organic matter should be part of soil management, along with attention to erosion control.

Smithfield Series

Found widely in small areas throughout the watershed, Smithfield is usually associated with the Schomberg series. Smithfield is characterized by gently undulating topography, imperfect drainage and is stone-free. It is a silty clay loam. Used mostly for dairying and mixed farming, Smithfield benefits from tile drainage.

Muck soils are found in most townships in the watershed. They are commonly found in depressions in upland areas, and are generally undrained and often inundated with water. They have value as wildlife areas and for water storage.

Several of the muck areas have been cleared and drained, and are used for agriculture. Special surveys of two of these areas are described in Chapter 5.

These are the major soils of the watershed, occuping nearly 70 per cent of the land area.

Other soils found in small areas in the watershed include the following:

well drained -

Bennington - sandy loam
Bookton - sandy loam
Burford - loam
Donnybrook - sandy loam, stony
Dundonald - sandy loam
Dunedin - clay loam
Farmington - shallow loam over bedrock
Otonabee - loam
Waterloo - sandy loam, rough
Wyevale - sandy loam

imperfectly drained -

Dumfries - loam
Embro - sandy loam
Kemble - clay loam
Listowel - loam
Wiarton - loam

poorly drained -

Colwood - sandy loam
Minesing - marly clay loam

Sheet erosion on Class III land. Good rotations and attention to organic matter levels can control such problems.

Sand blowout on Tioga Sand in Flos Township. Such areas should be in tree cover.

CHAPTER 4

## LAND: ITS USE AND CONDITION

### 1. Past Development*

The Nottawasaga River and its tributaries and the land through which they flow figure frequently in the early history of Upper Canada. Champlain, in one of his trips in 1616, visited Indians in what is now Nottawasaga Township. He reported that the Huron Indians

> "depended more on agriculture than on the products of the chase. Their main crop was Indian corn which they consumed in many forms - as bread, as pudding, as soup, as roasting ears which they used in bartering for furs with other tribes. Kidney beans and squashes were grown by the Algonkins. They cultivated sunflowers for the double purpose of making a kind of soup and a hair oil."

The Huron Indians kept their fields in cultivation for a relatively short period, usually not much over five years, and then abandoned them for new ones. This practice was ascribed to the increasing difficulty of obtaining fuel in the vicinity of the villages and to the exhaustion of the soil. Another and perhaps more reasonable explanation is that their clearings became overrun with grass which they could not eradicate with wooden shovels and pointed stakes and they had to move elsewhere.

It is clear that in the Huronia part of Ontario, at least, the Indians were already in transition from a nomadic to a "shifting-cultivator" type of culture. While their efforts at agriculture seem very primitive even when compared to those of the early settlers, they did remarkably well considering their lack of draught animals and of any type of implements. As a matter of fact, their achievements in growing crops were quite remarkable. When the first French settlers came to the area, they borrowed the Indian's methods. The French were soon making maple sugar and quickly started to grow Indian corn and other products of the soil in somewhat the same way as the Indians were already doing. The first agriculture practised by white people was of course around the early military forts and trading posts.

Different explorers and military expeditions passed through or set up forts in the Nottawasaga area during the latter part of the 16th Century and

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* Material in this section is based on - Hunter A.F. A History of Simcoe County, sponsored and distributed by the Historical Committee of Simcoe County, Barrie, 1948.
Jones R.L. History of Agriculture in Ontario. University of Toronto Press, 1946.

throughout the 17th. It was not until the early years of the 18th Century, however, that any attempt was made towards settlement. In 1818 the Government commenced staking out townships for settlement. An objective of the early surveys was to have the concession lines run to the water if a township bordered on a navigable river or lake. Differences in the method of early surveys and the sizes of lots are responsible for the present wide diversity in the road grid pattern and the farm size.

Large grants of land to colonization companies and to individuals had been a feature of the settlement of some counties in Ontario; there were not any similar large grants of land in Simcoe County. Most of those who did receive free grants in the early years consisted of United Empire Loyalists, the militia who served during the war of 1812, and retired British Army officers. Almost all others who became settlers obtained their lands by purchase.

The first European settlers in Simcoe County took up land just to the north-west of the Town of Bradford in an area now called the Scotch Settlement. They had come east from Lord Selkirk's Red River Settlement. They came down the lakes and up the Nottawasaga River to Willow Creek and down Lake Simcoe. There were other scattered settlements in Simcoe County but settlement was slow for the next decade. It was not until 1831 that a considerable influx of settlers took place. In Simcoe County, as elsewhere throughout the Province, pioneers settled in groups or clusters, often according to their nationality. By 1837 the municipalities of Bradford and Barrie contained a dozen or two families each. Collingwood and Stayner did not come into existence until the construction of the first railway in 1854. After the rebellion of 1837, a steady stream of settlers came to the county.

The first road in the watershed connected Kempenfelt Bay with Willow Creek, a tributary of the Nottawasaga River, and was a connecting link in the water route from Lake Ontario by way of Lake Simcoe to Lake Huron. This road dated back as a trail into the 18th Century. The first colonization road in the watershed was completed in the fall of 1825 and connected West Gwillimbury to the head of Kempenfelt Bay. This road was an extension of one previously built from West Gwillimbury to Lake Ontario. In 1833 the Sunnidale Road, running from the head of Kempenfelt Bay to the Nottawasaga River near Angus, then to Nottawasaga Bay, was completed. The smooth sand beach at Nottawasaga Bay was used for a road for settlers going east into Flos and Tiny Townships and farther west into

Nottawasaga Township. In the 1830's a road from Dundas Street in Etobicoke Township was opened north to Adjala and Tecumseth and another branch came north to Mono Mills, aiming for Nottawasaga Bay. A portion of this road was opened late in the 1830's from Nottawa to Duntroon and permitted the building of the first mills on the Pretty River. In 1846 the Owen Sound Mail Road was opened from Nottawa to Meaford.

In 1845 agitation began for the building of a railroad from Lake Ontario to Georgian Bay. It took years to accomplish this, however, and it was not until 1853 that the railroad reached Barrie from Toronto. It was pushed as far as Collingwood in 1855. This railroad was called the Ontario, Simcoe and Huron and was the first railroad in Upper Canada open for passenger and freight traffic.

The opening of roads and a railway did much to speed up settlement of Simcoe County. Heavy settlement started in the southern townships and gradually worked northward. Innisfil had few settlers before 1830; Sunnidale received its first settlers in 1833 and Nottawasaga Township about the same time. By 1850 much of the Nottawasaga Watershed was settled.

In this area, as elsewhere, many of the first settlers discovered that the task of clearing land into a cultivable acreage was a very different operation from that of tilling and cultivating the land. In many respects these were different occupations and required different tastes and interests. It happened that many of the original pioneers were more interested in clearing the land than in farming it. After clearing they often sold their land and moved farther back into the uncleared part of the watershed, leaving their acreage for other settlers who could more properly be called farmers. The earlier "better farmers" were few in number and were usually of Lowland Scotch or English origin. They became the agricultural leaders of the region. The early settler had few livestock and usually took very poor care of those he had.

The Nottawasaga region, like the rest of Upper Canada, first established its agricultural reputation as a producer of wheat. Wheat was the staple crop of the early farmers. It was often sowed in land immediately after clearing and the farmer continued to grow it long after the stumps had gone. Wheat seemed to be always more or less in demand and could be sold for cash; other crops were useful only for barter. Wheat continued to be the main crop for many years. Oats, peas and barley were grown in later years but were for consumption on the farm and not for trade. Oats could be grown on poor land but often with consequent low

yield. Peas were preferred to corn as being more dependable and of use for fattening hogs. They were often grown in rotation to prepare the land for wheat. The average farmer was not much interested in these other crops; his object was to produce as much wheat as possible. All too often the early wheat farmers "mined" soil and grew wheat year after year on the same land until the yield became very low.

The better farmers, however, followed a rotation system of sorts. Summer fallow was always part of this rotation with oats, sometimes peas, and a period of seeding down to grass. By 1850 some farmers were ploughing down clover or buckwheat before seeding wheat, as an alternative to summer fallow.

In the 1830's a good average wheat yield was reported to be between 22 and 25 bushels per acre. The census of 1861 gives Simcoe County a total of just over 200,000 acres of land in cultivation of which 15,500 acres were in winter wheat and 44,000 in spring wheat. The same census gives a figure of 13 flour and grist mills as existing in Simcoe County and reports that they used a total of 60,000 bushels of grain. This census reports 51 sawmills, two distilleries, two breweries, seven tanneries, one foundry, and 76 mills making woodenware products of one type or another. In an 1869 report to the Ontario Legislature by the Agricultural and Horticultural Societies, the following statement appears:

> "If farmers turn their attention more generally to stock raising it would prove remunerative to him and the land would not become as impoverished as it is by continual cropping."

Wheat acreage in Ontario continued to increase until the 1880's. The census figures for 1881 give the wheat yield for Simcoe County as 530,000 bushels. After the 1880's wheat acreage in Ontario declined with the opening up of the wheat-growing areas of the American west and the Canadian prairies.

With wheat generally proving to be a profitable cash crop, there was for a long time considerable resistance on the part of farmers to general introduction of many livestock into their farming operations. Many of the livestock on farms were of poor breeding and poor quality. The Government and early agricultural societies paid a great deal of attention to persuading farmers to raise more livestock and to improve quality and breeding. As early as 1836 there is record of an agricultural society for Oro, Orillia, Simcoe and Thorah. Early in the 40's an annual fair was held in Barrie and also a ploughing match on an adjoining farm. The first Provincial exhibition was held at Toronto in 1846. Other local agricultural shows soon followed and tended to spread an interest in improvement of

livestock and crops. By the 1880's the agricultural societies in Simcoe County were receiving financial aid from the County Council.

During the 1860's fruit growing steadily increased in importance owing to the failure of the wheat crop, the expansion of urban centres, the construction of railroads and the general rise in living standards. By 1881 it was noted that:

> "fruit growing is extensively carried on along the shores of Georgian Bay. Peaches, pears and grapes do well but plums are grown in very large quantities and they are famed for quality and flavour. Large quantities of winter apples are shipped yearly - at least one half of the quantity grown is thus disposed of. The price fetched is from $1.50 to $1.75 per barrel. Apple and plum orchards are becoming increased every year and there is every prospect of the shore townships becoming a great fruit growing region."

## 2. Present Use

Agriculture is the dominant land use of the Nottawasaga area. Approximately 72 per cent of the area is rotational cultivation; the remainder is woodland or idle (from an agricultural standpoint).

Several influences not connected with agriculture are at work in the area. For many years the large military establishment at Camp Borden has been a dominant factor in the region. The camp itself is located on low-grade agricultural land. It does not provide a direct market for agricultural produce. Perhaps its greatest influence has been the opportunity provided for off-farm employment for a considerable number of the surrounding farm populace. Conversely, a growing number of both civilian and military staff have purchased small holdings and erected houses in the surrounding townships.

The most important influence on Nottawasaga land use in the past decade has been the proximity of Metropolitan Toronto and its surrounding satellite population. The northern border of Metropolitan Toronto is only about 40 miles from the centre of the watershed. A growing number of urbanites looking for country property have purchased acreages in the Nottawasaga area. The purchases have tended to be concentrated on the rough land in the south and west, along the escarpment. Much of the land purchased for recreational and urban owner uses is agriculturally poor. Urban demands for country property have created a buoyant real estate market and there has been a significant increase in land values in the past decade.

Tobacco, which has been grown in the area for over 20 years, Christmas trees and nursery sod are specialized crops which have had a significant effect on land uses and also on land values.

(a) General Agriculture

Possessing a wide variety of soils and topography, the Nottawasaga Watershed is equally diverse in its agriculture. A great majority of farmers, however, operate general-type farms. Livestock farming, both beef and dairy, is the backbone of the agriculture of the watershed with, of course, many farmers having hogs as a secondary source of income. Most of the watershed is within the Toronto milkshed and there are many dairy farms, particularly in the southern townships. Beef farming predominates in the northern townships.

Crops grown in the region are those which are necessary to support the livestock - small grains and corn, pasture and hay.

The 1961 Census of Canada reported 74 per cent of the farms in Simcoe County as being commercial (i.e. selling agricultural products with a value of $1,200 or more a year). The other 26 per cent are classified as either small or part-time farms.

The breakdown of commercial farms in Simcoe County by main source of income is as follows:

| | |
|---|---|
| Dairy | 11.3% |
| Beef | 32 % |
| Hogs and sheep | 46 % |
| Poultry | 2.5% |
| Wheat | 0.5% |
| Tobacco, potatoes | 3.4% |
| Fruit and vegetables | 4.5% |

Wheat was grown on 38 per cent of the farms in Simcoe County in 1961, with 56 per cent reporting oats. There were 24 per cent of the farm operators reporting more than 100 days' work per year off the farm. This work includes 5 per cent at construction, 4 per cent in factory work and 3 per cent driving trucks, buses, etc.

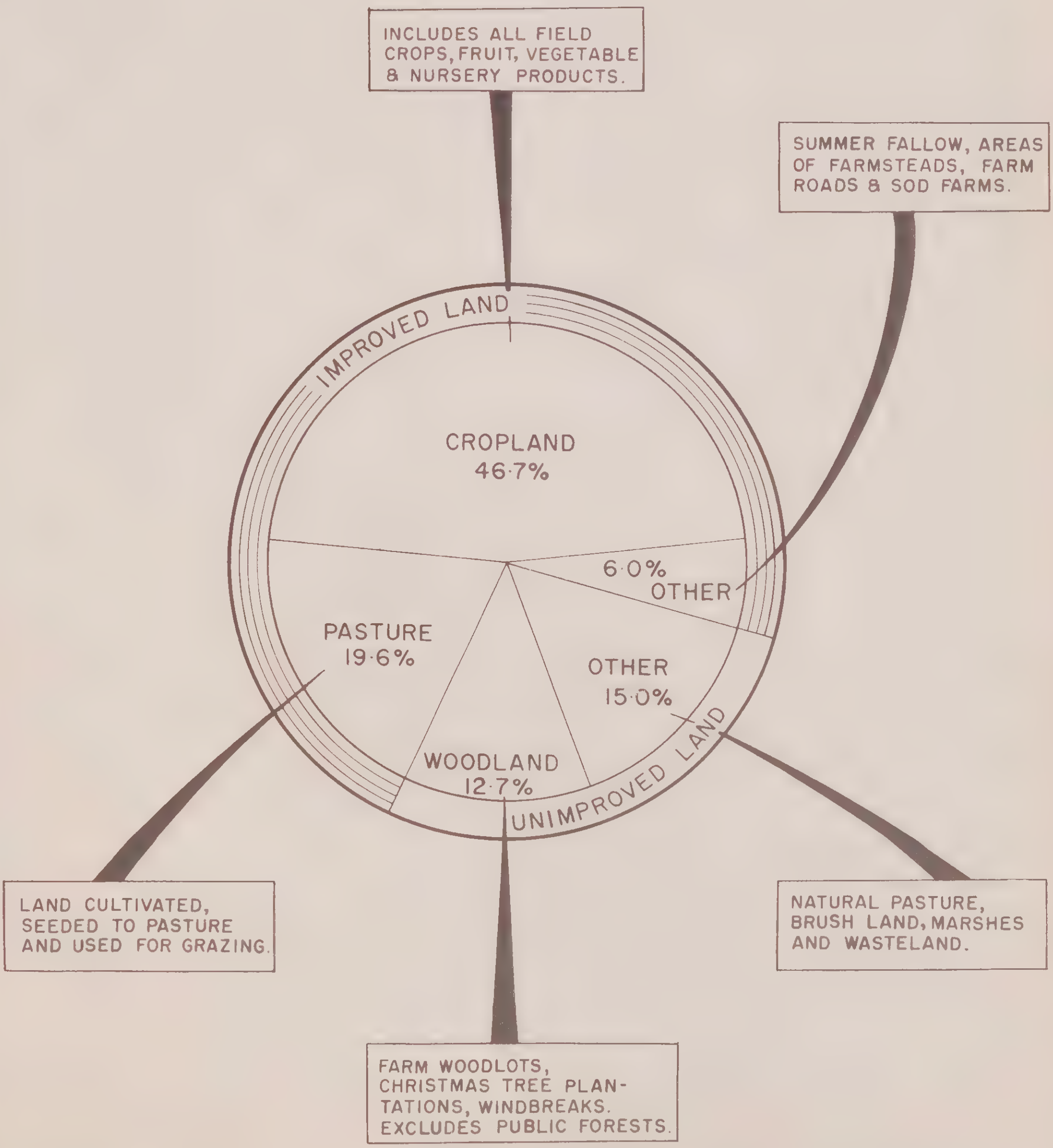
Total Capital Value of Farms
(land, buildings and equipment)

| | |
|---|---|
| Under $ 15,000 | 33.5% |
| 15,000 - 25,000 | 29 % |
| 25,000 - 50,000 | 36 % |
| Over 50,000 | 1.5% |

# MAJOR AGRICULTURAL LAND USES OF THE WATERSHED

(FROM 1961 CENSUS OF CANADA)

AS RELATED TO OCCUPIED FARMLAND




NOTTAWASAGA L.&F. CONSERVATION AUTHORITIES BR. T.L.L. 1964


DISTRIBUTION OF CULTIVATED LAND

Average Size of Farms

| | |
|---|---|
| up to 69 acres | 18.3% |
| 70-129 acres | 35.0% |
| 130-239 acres | 32.5% |
| 240-559 acres | 13.5% |
| 560 acres and over | .7% |

(b) Specialized Crops

The specialized crops tend to be concentrated in certain parts of the watershed. This concentration is caused by soil, location, climate and, to some degree, markets.

Winter Wheat

In the south-west corner of the watershed in Adjala, Tecumseth, West Gwillimbury and Essa Townships is a heavy concentration of winter wheat growing. About 52 per cent of the total acreage of winter wheat in the county is grown in this district. Winter wheat is grown on both of the major soil types of the area, Schomberg silty clay loam and Bondhead loam.

The wheat is sold as a cash crop. In most cases wheat growing is combined with livestock raising.

Potatoes

There are two major commercial potato-growing areas in the watershed. One is in Melancthon and Mulmur Townships around Highway 24 in the Shelburne district, the other in the Beeton-Alliston area. Scattered commercial fields also occur around Barrie.

Potatoes do best in light- or medium-textured soils which are well drained but not unduly susceptible to drought. Honeywood sandy loam and Tioga fine sandy loam are the predominant soils used for potatoes. Tioga soils are used in the Alliston area, with Honeywood soil types the most common in Mulmur Township. Most of the Class I soil of the watershed is found on the Honeywood types and much of this is growing potatoes.

The extensive potato acreage (13,600 acres in or close to the watershed) has led to the establishment of plants for processing potatoes for chips and packaged (dehydrated) products. Central grading and packing facilities exist for marketing unprocessed potatoes.

## Tobacco

A specialized high-value crop well suited to the sandy soils found in some parts of the watershed, tobacco is grown mainly in an area around Camp Borden. It is concentrated about New Lowell, Tioga Station and Alliston.

In 1961 there were 96 farms producing tobacco. These farmers held rights totalling 4,319 acres. All of the tobacco grown is flue-cured.

The Tobacco and Petun Indians were found growing tobacco in this area by the first European explorers. The first commercial tobacco farms using present-day methods were established near New Lowell in 1939. As elsewhere in Ontario, these farms were established on soils previously believed useless for growing agriculture crops. Tobacco growing on a commercial basis is highly specialized and carefully regulated.

Tobacco soils must be light-textured, low in organic matter and well drained. Low inherent fertility is an advantage as levels of fertility can then be quite exactly controlled with the use of commercial fertilizers.

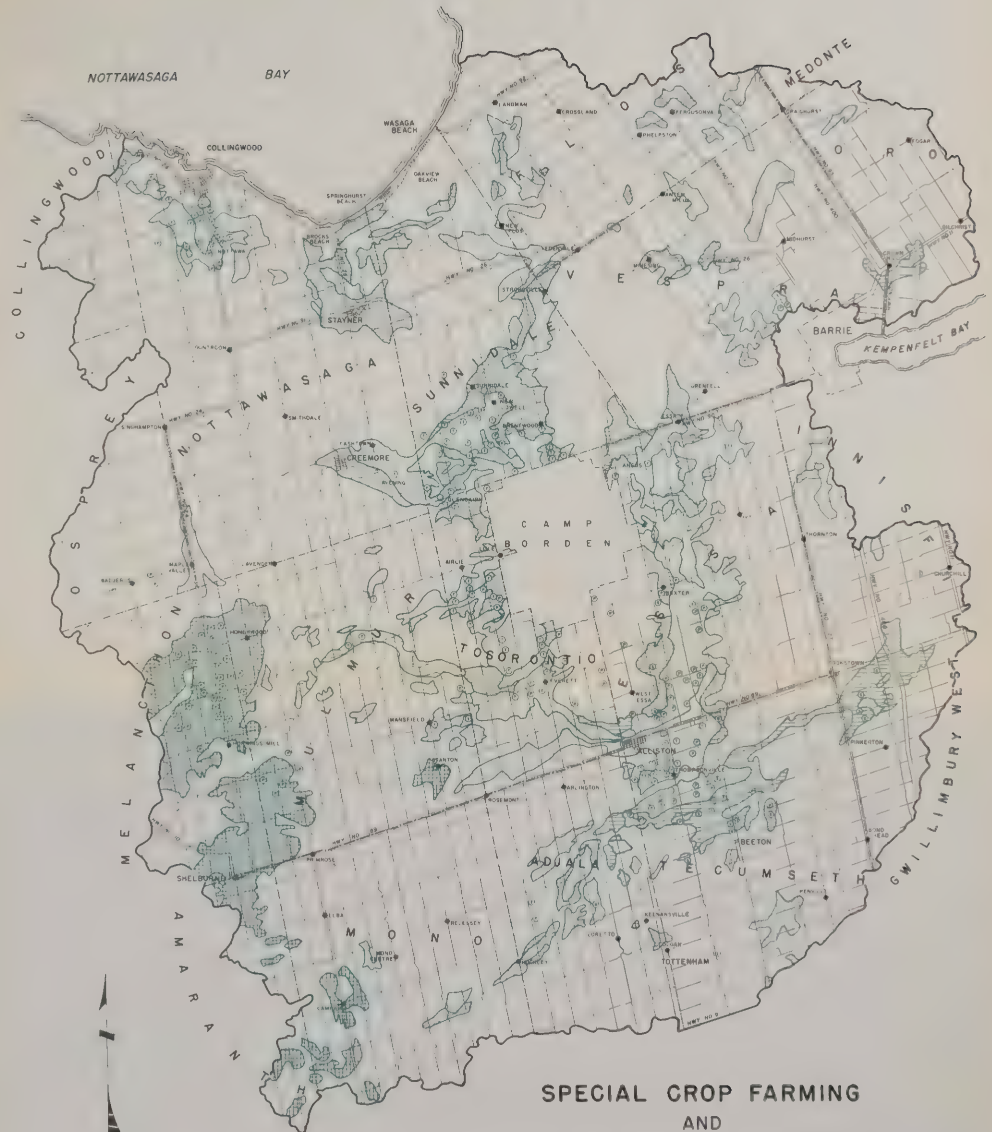
Tioga and Burford soils are the best and most commonly utilized tobacco soils in Ontario. In the Nottawasaga Watershed tobacco is grown almost exclusively on these soils. Open and light, the soils are very prone to drought conditions. Supplemental irrigation is essential in most years for a successful crop.

## Fruit and Vegetables

The fruit-growing region of the watershed is devoted mainly to orchards. It is concentrated in a 16-square-mile area in Nottawasaga Township on Highway 24 between Collingwood and the hamlet of Duntroon. This area is the easterly limit of the Georgian Bay fruitbelt. It concentrates on apple production with some cherry orchards.

Apple growing in the area started in the 1860's. It is confined to a narrow zone in which the moderating influence of Georgian Bay is combined with suitable soils. Most of the orchards are below the 800-foot contour. The proximity of the bay protects the trees and their fruit buds against severe winter temperatures, retards spring temperatures until frost danger is passed, and moderates fall temperatures during ripening and harvest.

Perhaps the most critical temperatures in apple production are the winter lows; in this area the mean winter temperature is 22°F with a record low of -35°. The land type favouring orchards is a moderate slope with well drained soils.




# SPECIAL CROP FARMING
## AND
## RELATIONSHIP TO SOIL TYPES

LEGEND

CROPS
- FRUITS & VEGETABLES
- POTATOES
- SOD
- TOBACCO

SOILS
- TIOGA SERIES WELL DRAINED
- BURFORD SERIES WELL DRAINED
- HONEYWOOD SERIES WELL DRAINED
- ALLISTON SERIES IMPERFECTLY DRAINED

SCALE - MILES

0 2 4

L&F CONSERVATION AUTHORITIES BRANCH T.L.L. 1963

The topography of the Collingwood area provides suitable slope and soil types. In 1961, 625 acres of apples and 172 acres of sour cherries were recorded in this section of the watershed.

In association with the orchard areas around Collingwood is a considerable acreage devoted to vegetables and some small fruits. To utilize the tomatoes and asparagus as well as the orchard fruit produced, a canning and processing industry has grown up in the town of Collingwood.

Small areas of muck have been cleared and are growing vegetables in the south-eastern part of the watershed. One of these areas is situated east of Cookstown along the south boundary of Innisfil Township. Marketing of produce is done through outlets at Bradford.

Nursery Sod

In recent years the great urban growth around Toronto and Hamilton has created a tremendous demand for "ready made" lawns, that is, lawns made by laying down sod, rather than by seeding. Originally pasture sod was used for this purpose but in recent years turf has been grown especially for lifting and selling to landscape contractors and home owners.

Several entrepreneurs in the Alliston-Beeton area have been growing extensive fields of nursery sod. Level, stone-free, sandy loams are favoured. Most of the sod farms are located on Alliston sandy loam which is imperfectly drained. Almost all of the production goes to the Toronto-Hamilton area.

Christmas Trees

Extensive areas of low capability land have been utilized for the growing of Christmas trees. This crop is concentrated in the valley of the Pine River in Mulmur Township but it can be found growing in other townships wherever light, sandy or gravelly soils are located, particularly where the topography is hilly.

Christmas tree crops make use of lands unsuited for general agriculture or tobacco production.

Some discusion on the Christmas tree industry in the watershed is found in the Forestry Section.

3. Future Trends

The Nottawasaga area will remain an agricultural watershed in the foreseeable future. Those areas with high capability land will always be in demand both for livestock farming and for specialized crops. Future changes in farming

practices in this area will generally be those occurring everywhere in the province. The trend will undoubtedly continue to fewer and larger farms with probably increasing specialization. With the present overproduction in tobacco it is unlikely that there will be any significant increase in the near future in tobacco acreage in this watershed.

Potato growing may very well increase as there is a considerable area of suitable soil available. The popularity of processed potatoes in their various forms seems to be increasing. This region has processing facilities which are capable of handling a larger acreage than at present.

Indications are that the main growth in Christmas tree production will be in the areas under the control of the large commercial growers. The market is currently suffering from a degree of overproduction. Growing demands for nursery sod will create larger markets and there will be an increase in the production of this crop in the Province. Soils suitable for nursery sod are to be found in considerable amounts in this watershed, hence some of the increase in nursery sod production will likely occur here.

With the City of Barrie on the edge of the watershed being the only rapidly growing urban area in the watershed, there is no danger of any significant areas being required for urban growth for the remainder of this century. Nevertheless, urban influences will continue to have an increasing bearing on land use. The present demand for recreational land close to urban centres is certain to increase. This increase will be measured in the need for more land for parks and conservation areas, for ski resorts and golf clubs. The topography of the watershed is well suited to all of these uses. Perhaps even more important will be the continuing demand for urban-owned rural "retreats", country homes and the like. More and more of the marginal and sub-marginal land (Capability Classes IV to VII) will pass into the hands of urban owners. Little of the land under such ownership will be used for agriculture; much of it will lie idle or be reforested. From a soil conservation standpoint, such practices are good, and better than an unsatisfactory agriculture.

## 4. Land Capability

It is important that a farmer know the capability of his soil to produce crops, just as he must know the capability of his tractor or of his live-stock. His soil is the basis of his whole farm operation and his income. Used

with good judgement, it can produce indefinitely at high levels; used poorly, the soil will quickly deteriorate.

Good land management requires a good knowledge of the soil. County soils maps are an inventory of the type and distribution of soils in the county. Such information is basic to developing good soil management programs.

Given the information in the soil report and from a conservation survey, plus close observation of the crop's response to treatment of the soil, we have much of the basic information needed to manage or advise in the management of any land area. In order to better organize all of the facts known about a given land area, a land classification system has been developed. Originally devised by the United States Department of Agriculture, the system has been revised somewhat by the soil scientists of the Ontario Agricultural College to suit Ontario conditions.

The system of classification helps to organize significant information on given soils for crop use. It is called a land capability classification, the term "capability" relating to the degree of hazards and limitations in managing the land.

Land classification is based on the soils surveys. It includes such factors as topography, slope, drainage and flood hazard, presence of stones and erosion susceptibility. It is designed to help landowners interpret soils maps and to make possible broad generalizations based on soil potential, use limitations and management problems.

## Eight Capability Classes

The system places all land into one of two divisions - land suited and land not suited to cultivation. Each division contains four capability classes. These classes are distinguished from each other by the degree of permanent limitations - that is, risks involved in their use. The basis of difference between classes is their permanent physical features. These features limit land use or impose danger of erosion or other damage to the soil.

### A SOILS SUITED TO CULTIVATION

Soils in these first four classes are suited for cultivation.

Class I - Soils have few limitations to restrict their use.

Soils in this class are suited to a wide range of plants and may be safely used for all cultivated crops, pasture, range, woodland and wildlife. The soils are nearly level and erosion hazard either by wind or water is low. They are

generally deep, well drained and easily worked. They hold water well and either are fairly well supplied with plant nutrients or are highly responsive to fertilizer. The soils are productive and suited to intensive cropping.

Soils in Class I that are used for crops need only the ordinary management practices to maintain productivity - both soil fertility and soil structure. Such practices may include the use of one or more of the following: fertilizers, cover and green manure crops and crop rotations.

Class II - Soils in Class II have some limitations that reduce the range of crops or require moderate conservation practices.

These soils may be used for cultivated crops as well as pasture, range, and woodland. They may have some minor use limitations that require some conservation practices. These limitations may include gentle slopes, moderate susceptibility to wind or water erosion, somewhat unfavourable soil structure and workability, wetness correctable by drainage, or less than ideal depth of soil.

The farm operator has somewhat less latitude in the choice of crops and management practices in soils of this class as compared to Class I. Special management practices may include the need for soil-conserving cropping systems, water control devices such as vegetated waterways, or more attention to crop rotations.

Class III - Soils in Class III are subject to a number of cultural limitations. Limitations on soils in this class may restrict the amount and type of cultivation or the choice of crops.

Limitations in Class III land may result from the effects of one or more of the following:

(1) Moderately steep slopes

(2) Considerable susceptibility to water or wind erosion

(3) Slow permeability of the subsoil and generally imperfect drainage

(4) Rather shallow depths to bedrock

(5) Rather low moisture-holding capacity.

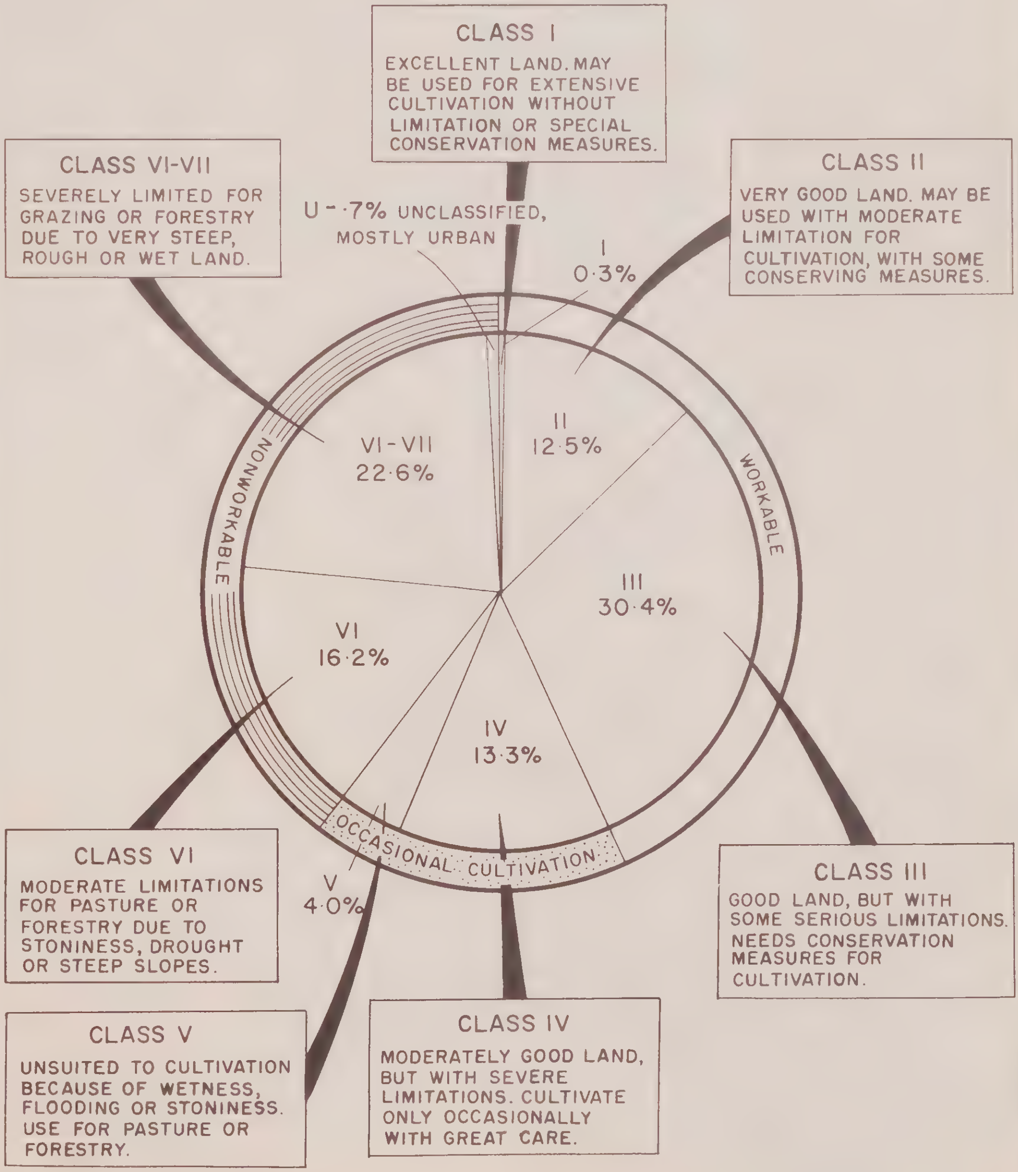
Class III land requires cropping systems that provide adequate soil cover. Management measures needed are longer rotations including sod crops, contouring and strip-cropping, grassed waterways and artificial drainage.

Class IV - Soils in Class IV have severe limitations that restrict the choice of crops and require very careful management.

Use of these soils for cultivated crops is limited as a result of the effects of one or more permanent features such as:

# LAND CAPABILITY

## DISTRIBUTION OF CAPABILITY CLASSES




NOTTAWASAGA

L.&F. CONSERVATION AUTHORITIES BR. T.L.L. 1963


AGRICULTURAL LAND CAPABILITY CLASSES

(GENERALIZED)

LEGEND

LAND SUITED TO CULTIVATION
Classes I, II & III

LAND SUITED TO OCCASIONAL CULTIVATION
Classes IV, V

LAND NOT SUITED TO CULTIVATION
Classes VI and VII

(1) Steep slopes

(2) Severe susceptibility to water and wind erosion

(3) Shallow soils

(4) Low moisture-holding capacity

(5) Excessive wetness with continuing poor drainage.

Class IV soils may be cultivated occasionally with great care. When cultivated, very careful management measures must be used to see that the soil is not depleted by erosion. They should be kept in permanent grass cover most of the time.

## B LAND LIMITED IN USE - GENERALLY UNSUITED TO CULTIVATION

The soils in the last four classes are not generally suited to cultivation but should be kept in permanent cover.

Class V - The soils in Class V have little or no erosion hazard but do have other limitations of such nature that it is impractical to remove them for normal tillage of cultivated crops. They are nearly level but are often wet and frequently overflowed by streams (bottomlands). They may be stony or have a combination of these limitations.

Examples of Class V land are:

(1) Bottomlands subject to frequent overflow which prevents the normal production of cultivated crops

(2) Level or nearly level, stony or very rocky soils

(3) Ponded areas where drainage for cultivated crops is not feasible, but where soils are suitable for grass or trees

Because of these limitations, cultivation of common crops is not feasible, but pastures can often be improved and benefits from their good management can be expected.

Class VI - Soils in Class VI have severe limitations that make them unsuited to cultivation and limit their use largely to pasture, woodland or wildlife cover.

Soils in Class VI have continuing limitations that cannot be corrected such as:

(1) Steep slopes

(2) Severe erosion hazards

(3) Effects of past erosion

(4) Stoniness

(5) Excessive wetness or overflow

(6) Low moisture-holding capacity.

Generally speaking, lands in this class should be used for permanent pasture or for woodlots. Pasture use should be adjusted to carrying capacity or season.

Class VII - Soils in Class VII have very severe limitations that make them unsuited to any cultivation and that restrict their use to limited forestry or wildlife. These soils may be very steep, severely eroded, swampy or shallow with rock outcrops.

Class VII lands may have many limitations for pasture or forestry. Generally speaking they should be in permanent forest cover. Some lands may be used for limited grazing and they may also have value for recreation or as wildlife habitat.

Class VIII - Soils in Class VIII have limitations that preclude their use for any commercial plant production and restrict their use to recreation, wildlife, or water supply, or aesthetic purposes.

Such lands as very rocky areas, sand beaches, badlands or undrainable marshes are included in this class. Such lands are best suited for watershed protection or for recreation and sometimes wildlife.

## 5. Land Management Problems

Many factors contribute to the problems met in the management of soil. Some are physical problems of the land, others are economic or social. This report is concerned, however, with the physical problems of soil management.

In Ontario the major problems in soil management are those of drainage, fertility and erosion. On any one farm or on any given piece of land, one problem may predominate. There is often a combination of all three.

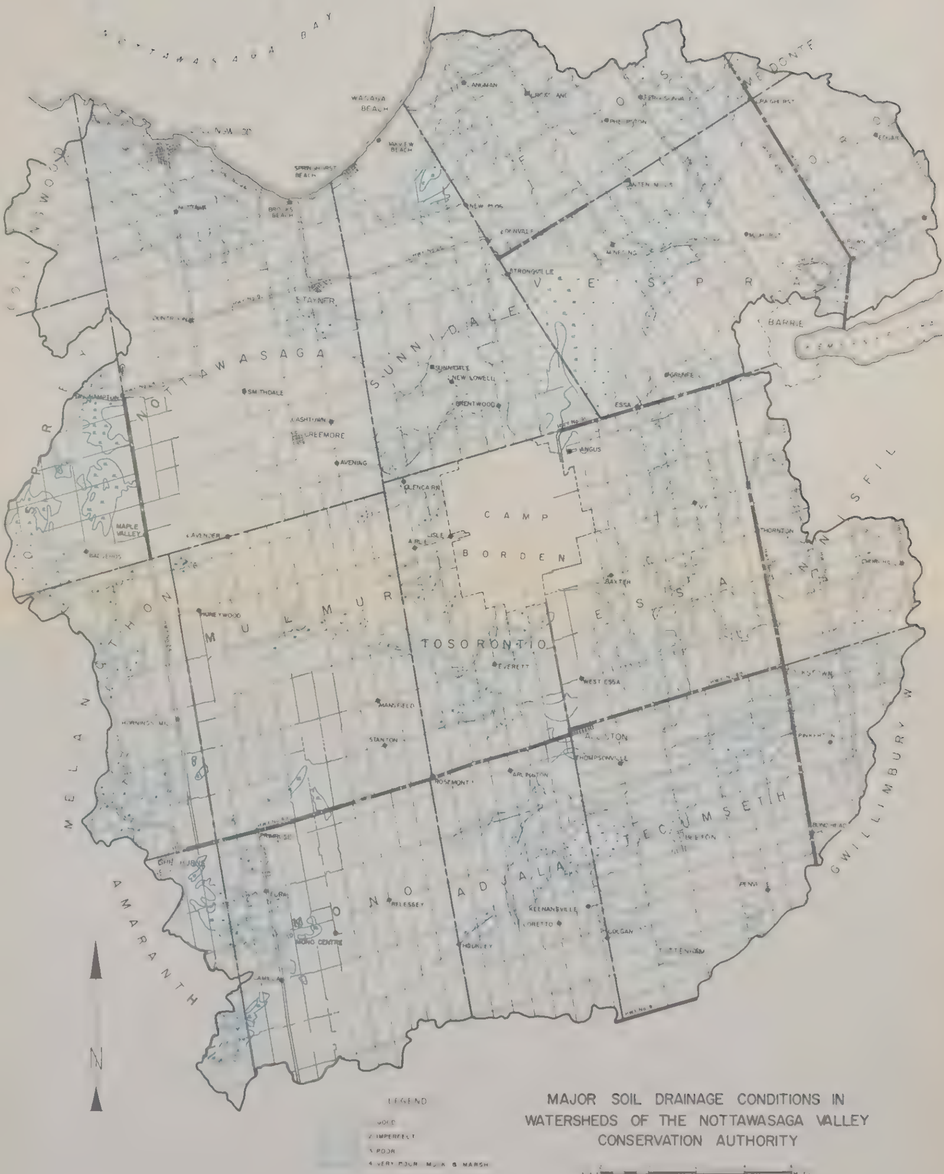
### (a) Drainage

Of the different problems in soil management, one of the greatest is the safe disposal of excess water. Uncontrolled runoff can cause erosion. As much water as possible should be allowed to soak into the ground.

Excess moisture may be on the land surface or within the soil itself. On most land it is necessary to get rid of both. Adequately drained land is necessary for good farm management.

#### (1) Surface Drainage

To remove excess water safely from the surface of the soil may require special measures. These measures may include grassed waterways, diversion ditches and protective devices along streambanks. There are many places in the Nottawasaga area where grassed waterways and other surface water disposal systems are needed. These may include ditches on farm fields or improved ditches and culverts along township and county roads.




MAJOR SOIL DRAINAGE CONDITIONS IN WATERSHEDS OF THE NOTTAWASAGA VALLEY CONSERVATION AUTHORITY

(2) Internal Drainage

A system of tile drainage is often used to remove excess internal soil moisture. Tile drainage of wet soils is a major contribution to soil conservation. Some of the most productive soil in Ontario is productive only because it has been tile-drained. Drainage allows increased yields of crops in low wet areas and permits slopes where serious erosion is likely to occur to be planted to more appropriate crops. The controlled removal of excess water from fields can be an aid in combating soil erosion.

Tile-drained fields permit increased yields of crops of better quality. The growing season can be longer by reason of earlier planting. With drainage, more flexible crop rotations and management practices are available.

(3) Drainage Conditions of Watershed Soils

About two-thirds of the soils of the Nottawasaga area are classified as well drained. Of the remainder about 15 per cent are imperfectly drained and 15 per cent poorly drained. Approximately 5 per cent are described as muck or marsh and are classified as very poorly drained.

Soils widely found throughout the watershed - such as Tioga, Vasey, Bondhead, Honeywood and Schomberg - are all well drained. Of those that are described as imperfectly drained, Alliston occupies the greatest area. Most of the imperfectly drained soils will benefit from tile drainage. Poorly drained soils, of which Granby is one of the most widely found, generally do not respond to drainage sufficiently well to justify the cost. The poorly drained soils in the watershed are mostly growing grass and trees and should remain in that condition. The exception is some areas of muckland that have been cleared and artificially drained and are now being used for vegetable production.

(b) Fertility

Soil fertility is the ability of any soil to supply the nutrients necessary for plant growth. Maintenance of soil fertility is one of the major problems in soil management.

Some soils are naturally fertile, others less so. Differences in soil fertility may be inherent in the soil itself or they may be related to past management practices. Soils that have suffered from erosion may have lost the more fertile topsoil. Such practices as the use of manure and of crop rotations will have an influence on soil fertility.

Differences in the productive capacity of various soils are commonly recognized by the farmer on the basis of his experience and the crop responses. It should be noted here that soil fertility is not necessarily the same as soil productivity. An otherwise fertile soil may be limited by drainage condition or other factors that lessen production.

It is difficult to measure whether or not soil fertility is being maintained. It might be assumed that if crop yields do not decrease, soil fertility is being maintained. However, the use of improved varieties of crops, better tillage methods, different planting methods, may well maintain or increase yields without increase in soil fertility. Maintaining soil fertility is more than the application of fertilizer to the soil. It includes as well the maintenance of adequate organic matter, liming of acid soils, and protecting the soils against erosion. Organic matter levels may be sustained or increased by the use of green manure crops, by application of barnyard manures, or by working crop residues into the soil. Plenty of organic matter (humus) in the soil improves soil structure and makes better use of commercial fertilizers.

Soils should be tested before a commercial fertilizer is applied. Soil tests are a guide to the farmers in deciding the fertility needs of the soil. These needs and requirements may vary with past soil treatment and with the crop to be grown.

The predominant soil types in the Nottawasaga Watershed are sands and sandy loams. Generally speaking, such soils do not have the inherent fertility of the clays and clay loams. These soils require applications of commercial fertilizers for best crop responses. Tioga sand, for example, is naturally low in fertility and requires heavy fertilization. Where Tioga sand is used for high value cash crops, the return from fertilizer use is high. Where less fertilizer is applied, as when growing general crops, the crop response to the fertilizer is much lower. The same is true of the commonly occurring Alliston soils. Soils such as the Bondhead and Schomberg loams have a fairly high level of inherent fertility. Moderate applications of commercial fertilizer together with good soil management will produce good crop yields on such soils as these.

(c) Erosion

Soil erosion has been an agricultural problem ever since man began to till the soil. In some parts of the world erosion has damaged or completely destroyed great areas of land from an agricultural standpoint. Fortunately, in

Ontario our soils are not generally subject to serious erosion, although many small areas are to be found on which erosion has caused much damage.

Soil erosion may be defined as the "movement of soil particles from one place to another by wind or by water". Under natural conditions, soil is covered with vegetation which retards runoff and slows down erosion. When land is cleared for cultivation, the natural protective cover of vegetation is removed or reduced. Cultivation may change the structure of the soil and reduce organic matter. Such changes may easily produce in a short time a less productive soil.

Since soils must be cultivated for crop production, it is important to carefully fit the crop or the cultivation practice to the type of land being used. Cultivation methods which use protective measures as close as reasonably possible to those used by nature give maximum soil protection and allow a minimum of runoff and erosion.

Of the several factors and practices affecting the susceptibility to erosion of any piece of land, the most important are the physical characteristics of the land itself. Soil texture and the length and amount of slope influence the amount of erosion that may take place. Along with this are the amount and time of rainfall and the cultural practices used on the land.

The steeper the slope, the more rapid the runoff can be. Steepness of slopes is measured in percentage. Thus a five per cent slope means a fall of 5 feet per 100 feet of length.

The type and pattern of rainfall affect erosion. Intense rains often lasting but a short time can cause serious erosion of unprotected land. Heavy spring rains when the surface of the soil is soft but the sub-soil still frozen can be particularly damaging.

Vegetative cover, whether provided by trees or by grass or decayed plant matter on the soil surface, breaks the force of the rainfall and there is little or no runoff. Rainfall on clean cultivated land stirs up the unprotected soil and may cause serious erosion. Good sod cover will absorb rain rapidly and little runoff will occur. Grain crops will give the soil partial protection, row crops very little. Cultivating up and down the slope, soil left bare over winter and planting row crops on sloping land all contribute to water runoff and erosion.

Erosion can be caused by wind or by water. In Ontario, serious wind erosion is usually not widespread. However, wind erosion damage has occurred in past years on the lighter soils in the Nottawasaga Watershed. These lighter soils

are now in most cases well protected by sod or tree cover or are used for tobacco cropping. Nevertheless, there are still areas of soil subject to wind erosion damage that do require some attention to control.

Most soils under certain conditions are subject to erosion by water runoff. Water runoff not only removes soil from the fields but has more widespread effects such as the pollution of streams, silting of ditches and reservoirs and clogging of drainage systems.

The most direct and perhaps most serious effect of erosion is loss of topsoil. Such erosion may be spectacular in the form of gullies; mostly, it occurs gradually as sheet erosion. Topsoil contains most of the easily available plant nutrients and valuable organic matter. Its loss reduces crop yield and hence the owner's profits. The loss of water from soil by surface runoff is the cause of soil erosion and is serious in itself - on many areas it can be more serious than erosion. Cultivation practices which decrease the possibility of soil erosion also decrease excessive water runoff. This is particularly important during the summer months when lack of moisture may be a limiting factor in crop yield. The more rainfall that can be absorbed into the soils in dry seasons, the greater amount will be available for plant growth.

Much of the soil lost from the land eventually finds its way into stream courses and rivers. Many otherwise clear streams are polluted by soil wash. Such pollution, while not a health hazard, does affect fishing conditions in the streams; in some streams it can be a limiting factor. Silt blankets the stream beds and destroys many organisms that live there and provide fish food.

Field investigations show that bank erosion is prevalent on some stretches of the Nottawasaga River and its tributaries. It is most serious after very heavy rains or during periods of spring runoff. Accelerated erosion has occurred where there are no trees or shrubs growing on or along the banks. The Nottawasaga is a valuable trout stream. Measures should be taken to reduce siltation and bank erosion on these stretches of the stream where it is severe and to maintain the present relatively silt-free condition of other parts of the river.

Some of the commonly found soils of the watershed are subject to erosion unless managed carefully. Where slopes are steep, no cultivation should be done. Sheet erosion is evident in a number of areas in the watershed. It is particularly found along ridges and the steeper valley slopes. Often these areas have been cultivated until all the topsoil has been carried off, and they are now growing very poor pasture. Grazing of such areas should be carefully controlled,

particularly in dry seasons. Much of the soil lost from these areas is now in colluvial deposits at the foot of the slopes and is more or less stabilized by grass.

There is fairly frequent evidence of ditch and small gully erosion on some soils. These can be controlled by rotation and over-winter cover crops. Small eroding ditches can become large gullies unless controlled. Grass water-courses are a useful management practice for moving surface water over slopes that must be cultivated.

A few gullies are severely eroded, like the one in Lots 31 and 32, Concession IV of Mulmur Township. Such severe gullies should be fenced from live-stock and planted to trees.

There is some serious erosion along road ditches, particularly on township and county roads where new construction has recently been carried out. Some thought should be given to erosion control along road banks, perhaps by the use of "hydro-seeding" as commonly practised by the Department of Highways.

Potatoes are a major cash crop in parts of the watershed.

Irrigating tobacco on a farm near Alliston.

Checking soil for incidence of erosion and mapping slope and land classification on aerial photos is part of a conservation survey.

Lifting nursery sod. The growing of nursery sod for sale in urban markets has become common in the Alliston and Cookstown areas.

Class II land on the till plain west of Stayner.

Class IV land is best used for permanent pasture.

Abandoned farmstead on Class IV and VI land, Mulmur Township.

Class IV and VI land on the Singhampton moraine.

An apple orchard, one of the many along the base of the escarpment south of Collingwood.

Class I land in Flos Township.

# CHAPTER 5

## LAND IMPROVEMENT

An important objective in good soil management is to protect the soil from erosion and to hold as much as possible of the rainfall in a place where plants can use it.

One of the goals of conservation farming is to keep soil losses as close as possible to the rate of loss in a natural landscape. It is not normally possible or practical to use a farming system that will control soil losses completely. A farmer should be always aware, however, of the rate of soil loss and depletion occurring under his particular land practices. He should be ready to change or adjust these practices if it seems necessary.

A cover of vegetation is the first defence against erosion. Therefore a good soil management program will include increasing quantity and quality of vegetative cover as the land use capability class falls from Class I to Class VII. This cover may be in the form of permanent sod for pasture, grassland strips alternating with cultivated land in strip-cropping, or sod-covered channels for the safe runoff of excess water.

### 1. Grassland

Grassland is hay or pasture. For many years most farmers regarded pasture as a second-rate crop. Fields not suited to cultivation were left in pasture. Usually no measures to improve them were taken. Today, many farmers find that an abundance of forage is the very foundation of a profitable livestock farm.

The production and management of first-class pasture is not an easy job. It is often as difficult to produce good pasture as to grow grain or a cash crop. A peculiarity of grassland is that it is a combination of grasses and legumes, each with its own characteristics as far as fertility and soil requirements are concerned.

Grassland is of prime importance in controlling erosion and improving soil organic matter and soil moisture relationships. Grassland farming should be an integral part of the crop rotation system. Areas unsuited to cultivation should be put into permanent grass cover; other areas should have a sufficient proportion of grass to protect the soil and improve the production of cultivated crops.

Grasses and legumes provide organic matter for the soil and give it maximum protection against erosion. By improving soil structure and providing protection against the impact of the raindrop, water is dispersed and is more easily able to enter the ground to the benefit of the crop and the ground water supplies.

Advice on seed mixtures for permanent pastures, for renovating old ones or for controlling erosion can be obtained from the county agricultural representative or other personnel of the Department of Agriculture, or from local seed dealers.

2. Grass Waterways

Grass or sod waterways are watercourses on sloping land. They may be natural or they may be man-made. Whatever their origin they are kept in permanent sod cover. Grass waterways are the most important single item in the control of water runoff from cultivated land, where they are a means of conducting excess water safely from lands without allowing erosion to occur. They are a simple and effective erosion control measure that can be used by any farmer.

The best locations for waterways are usually the natural drainage ways of the landscape. In many cases these natural drainage courses have been left in sod and should continue to be so. The simplest grass waterway is made by tripping cultivating implements as they cross a natural depression. In other instances waterways must be laid out and constructed in order to carry runoff safely away.

When constructing a new waterway, it should be large enough to carry safely the heaviest rainfall anticipated in, say, a period of ten years. A waterway should be broad and shallow, and should have a dense sod cover established on it as soon as possible. This sod cover should be maintained by regular fertilizing and, of course, it should never be broken up by cultivation.

Gullies are a symptom of land misuse, usually caused by cultivating too steep land or overgrazing it. Gullies often start in the banks of natural watercourses that have been cut to a considerable depth. When still small, gullies can be shaped into grass waterways and thus prevent any further erosion. More serious gullying will require more extensive and usually more expensive treatment. This may involve mechanical measures such as small check dams, planting of vegetation or trees to control erosion, or the construction of diversion waterways to direct the runoff water over another path while the gully is being repaired.

There are many places where grass waterways might well be used on farms in the Nottawasaga Watershed. The rolling topography of much of the watershed means that the soil is subject to concentrated water runoff on many cultivated fields. On most farms grass waterways can be easily and quite inexpensively constructed with the farmer's own equipment. In many areas, municipal road maintenance equipment can be obtained for reasonable rental and can be used to shape the watercourse.

### 3. Contouring and Strip-Cropping

Strip-cropping is a system of growing crops in strips or bands laid out in a systematic manner as a barrier to erosion. The arrangement of crops in strips should be such that erosion-resistant crops such as grasses are alternated with clean cultivated crops which may be subject to erosion.

Contouring is the arrangement of the strips across a slope at right angles to the natural slope of the land. The best slopes for contouring are broad and smooth. Contour tillage is most effective on slopes of 2 per cent to 8 per cent and not more than 300 feet long. Here the practice reduces soil losses to less than half that of up-and-down-hill cultivation. Satisfactory operation of strip-cropping may require the removal or relocation of fence lines. Most farms in this part of Ontario are laid out in a rectangular survey grid, hence fields are often not according to the "lay of the land", but are fenced up and down the slope.

The main benefit of contouring and strip-cropping is the reduction of soil and water losses. Another important benefit, however, is the greater ease and economy of farm operations. If strips are fairly long there is less frequent turning and power requirements are often reduced by "level" operation across the slope rather than up and down.

Contour cultivation, when used in combination with other good farming practices, effectively aids in conserving moisture. The small ridges and terraces formed by cross-slope cultivation act as very small dams to retain water and provide greater opportunity for its infiltration. Similarly, alternating sod strips slow down the water runoff and allow greater infiltration.

In some areas, particularly in tobacco-growing districts, sod strips are used on level land as a barrier to wind erosion.

Advice and assistance on erosion control can be obtained through the agricultural representative from the soil specialists attached to the Ontario Department of Agriculture. These men will be prepared to give assistance in laying

out contours, crop strips and grass waterways and plans for repairing of gullies or other measures which will aid in erosion control.

4. Woodland

Well-managed woodland plays an important part in any soil and water conservation program. It can help protect the individual landowner from soil and water losses. Forestry is important in the overall picture of resource management on a watershed basis. Forestry can be an integral part of many farm management plans. Most farms in the Nottawasaga Watershed have some area of woodland on them. Many should have more.

Certain land classes, particularly Classes VI and VII, otherwise described as marginal or submarginal land, should be under forest cover. If already wooded, they should remain so; if not, reforestation may be needed.

Reforestation is an erosion control measure on steeply sloping fields or about the sides and head of gullies. In some parts of the watershed, particularly along the escarpment, there is land that should be kept under permanent vegetation, either grass or trees. Some of this land can best be used as pasture, with areas of forest cover on the steeper slopes.

Woodland around springs or the source areas of streams will often aid in the regulating or restoring of flow. A woodlot included in a farm plan will have some value as wildlife cover also.

5. Farm Drainage

Well-drained soil is essential to good management of agricultural soils. The successful use of many thousands of acres of good farmland in Ontario is possible only because of artificial drainage.

Some of the benefits of drainage are:

(a) Increased yield and improved quality of crops.

(b) Earlier planting is possible and hence a longer growing season.

(c) Drainage may make low, wet areas available for grain or intertilled crops. Slopes where the erosion hazard is higher can be put into grass.

(d) It permits the use of more regular crop rotations.

(e) The controlled removal of excess water from soils can be an aid in combating soil erosion.

Much evidence is available, both experimental and from records of practising farmers, to show the benefits and values of drainage to crop yields. The table below illustrates the advantage of improving drainage conditions of soil.

The data in this table have been collected over a period of years from studies carried out in eastern Ontario, where records were taken on pairs of drained and undrained fields.

YIELD OF GRAIN AND HAY UNDER DRAINED AND UNDRAINED CONDITIONS, EASTERN ONTARIO, 1955-59

| Crop | 1955 | | 1956 | | 1957 | | 1958 | | 1959 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | D* | U* | D | U | D | U | D | U | D | U |
| Hay (tons per acre) | 1.8 | 1.3 | 2.4 | 1.9 | 2.2 | 1.9 | 2.4 | 2.2 | 1.8 | 1.8 |
| Grain (bushels per acre) | 54 | 27 | 67 | 37 | 68 | 70 | 70 | 54 | 54 | 56 |

Source: Unpublished data, Farm Economics and Statistics Branch, Ontario Department of Agriculture.

D - drained
U - undrained

Excess water can be removed by means of open ditches or by tiled underdrains. In the area of this Authority open ditches are used in some types of soils for drainage; most drainage, however, can be achieved best by means of tile systems.

Whatever the area to be drained, it is well to have a survey made before starting. A survey plan will show the proper location of mains and laterals, location of outlets, grades, depths and number of tile required. The Department of Agriculture, through its agricultural engineering fieldmen, will upon application carry out a survey for drainage work. Applications and information may be had from the office of the county agricultural representative.

Bulletin 501, "Farm Drainage", of the Ontario Department of Agriculture gives information on all types of drainage situations.

6. Farm Ponds

An adequate supply of water is essential on any farm for livestock and household use. In many areas the demand on water supplies is increasing, due to increased numbers of livestock, piped water supplies in house and barn and the use of water for spraying and for irrigation. On many farms, wells are not able to constantly supply this increased water demand.

Farm ponds can be an excellent source of water supply. They may be used as emergency or regular supply of livestock water. If near buildings, they offer fire protection. They can be of use for irrigation or spraying and as well they have value for recreation and for fish and wildlife.

A pond may get its water supply from surface runoff, springs or a permanently flowing stream. When designing a pond, its use and its water source should be kept in mind. To be successful, a pond must be properly located and properly constructed.

The Authority should publicize the value of farm ponds to the land-owner and the necessity for their adequate and proper construction. It should be emphasized that care must be taken in the building of dams, that spillway capacity should be adequate and emergency spillways always provided.

Many small dams have failed because proper precautions in their construction have not been taken. Before a dam on a permanently flowing stream is constructed, a close look should be taken at the stream's drainage area. If the drainage area is very large, the volume of water that will flow down the stream in runoff periods may be such as to require a quite expensive type of structure. It should be noted that the permission of the Surveyor-General for the Province is required before any structure may be placed across a stream.

Technical assistance on the location and design of farm ponds and dams is available from the agricultural engineering extension fieldmen of the Ontario Department of Agriculture. It is wise to secure such technical advice before proceeding with the construction of a pond or dam.

Installation of tile drainage is rapid and efficient.

A pond, well located and properly built, can be a valuable asset on any farm.

Class VII land on top of the escarpment near Singhampton.

Cultivation on the contour on a watershed farm.

Plowing in of green crops increases soil organic matter.

Grassed watercourses allow surface water to run off safely from cultivated land.

## CHAPTER 6

## THE NOTTAWASAGA BY TOWNSHIPS

### 1. Tecumseth Township: A Special Study

One of the most productive and fertile townships in Simcoe County, 93 per cent of Tecumseth is in the Nottawasaga drainage basin. The remaining 7 per cent is in the Holland River Watershed. Actual drainage in the township is through tributaries of the main Nottawasaga - Sheldon, Beeton, Bailey, Innisfil and Penville Creeks, all of which join together to form the main Nottawasaga which flows north out of the township at Nicolston.

The north portion of the township was once occupied by the ancient glacial Lake Algonquin. The level deposits of soil material are called the Tecumseth flats. The south part of the township also lies on another old lake bed. A body of water called the Schomberg Pondings once covered areas around present Lake Simcoe which are now referred to as the Schomberg clay plain. The land in the south part of the township slopes up towards the Oak Ridges moraine. The Schomberg clay plain is drumlinized, although many of the drumlins were partially buried by water-deposited soil materials and now emerge above the surrounding landscape as low hills. Several drumlins are clearly visible around Dunkerron and Bondhead. Elevations in the township range from 700 feet across the Tecumseth flats to a high of 1,000 feet in the extreme south-west.

The Tecumseth flats are quite level. Soils are generally silt or sandy loams and imperfectly or poorly drained. Predominant on the flats are Tioga fine sandy loam, Bondhead loam, Alliston sandy loam, Simcoe and Smithfield silt loam and muck.

The Tioga fine sandy loam is well drained, stone-free and level. It is low in moisture-holding capacity and natural fertility. Most of the township's tobacco farms are located on these Tioga soils around Alliston, tobacco being one cash crop that will pay for irrigation and heavy fertilizer applications. Wind erosion can be a problem on this soil, and shelterbelts are a worthwhile investment on tobacco lands.

A broad band of Alliston sandy loam roughly parallels Bailey Creek. Imperfectly drained, it is otherwise similar to Tioga. Usually too wet for tobacco, Alliston is used for general farming and is well suited to nursery sod production. Between the Alliston soils and the higher ground to the south are imperfectly

drained Smithfield and poorly drained Simcoe silt loam. Both soils are rather level and are stone-free. The Smithfield soils have generally been tile-drained and can be used for a variety of general farm crops. Simcoe soils are fertile and, when tile-drained, can be used for most general crops. Both soils are used for production of nursery sod.

Two swamps, mapped as areas of muck, lie along Bailey Creek. These are described in detail elsewhere. Areas of Bailey Swamp west of Beeton are being cleared, drained and used for vegetable growing or sod production.

Over 33 per cent of the area of Tecumseth Township is mapped as Schomberg silty clay loam. This is foumd mostly in the southern Schomberg clay plain, although a small area is located around Cookstown. This soil has developed from deep stratified deposits of clay and silt loam laid down in glacial waters over a rolling till plain. The hills of the till plain give Schomberg soils an undulating topography, with some steep short slopes and deeply cut streams. The soil is well drained and stone-free and is rated as one of the best soils in the Province. In the township it is used mostly for mixed farming with a large acreage annually in winter wheat. Livestock enterprises tend towards dairying, with pasture, hay and corn crops to support the dairy herds. The major soil management problem is erosion, both sheet and gully. The conservation survey noted numerous examples of the lighter-coloured subsoil showing up on slopes from which topsoil had been washed away. There is also danger of gullies starting where water runs off cultivated fields. There are many farms located on Schomberg soil where grassed watercourses could be used to advantage.

There are scattered areas of Bondhead loam throughout the township. To the west of Cookstown, around Newton Robinson and Bondhead, and west of Tottenham, these well drained, fertile soils have moderately to steeply sloping topography. In Tecumseth, Bondhead soil has few stones. It is used mostly for mixed farming. Like Schomberg soils, it can be damaged by erosion when not used with care. The steeper slopes, particularly on the drumlins, should be kept in grass or trees.

Areas of the Tioga loamy sand - Bondhead loam soil complex are mapped in the south-west part of the township, to the south of Beeton and in the extreme south-west corner. The complex is composed of about 65 per cent Tioga, 20 per cent Bondhead, and small areas of several other soils, all occurring in such close association as to make mapping separately too difficult. These soils have very rough topography with short, steep, irregular slopes which are too hazardous for most farm

implements. Both wind and water erosion have been severe; cultivation must be carried out with extreme care and confined to the less steep slopes. Crop rotations should run heavily to permanent pasture. All crops need careful attention to fertilizing.

Nearly 70 per cent of the soils of the township are well drained, about 15 per cent imperfectly drained and the remainder either poorly drained or muck.

Agricultural land capability classifies the land as follows:

| | | |
|---|---|---|
| Class I | - | 0% |
| Class II | - | 23% |
| Class III | - | 42% |
| Class IV | - | 17% |
| Class V | - | 4% |
| Classes VI and VII | - | 14% |

Sixty-five per cent of the township can be used for regular cropping, with a further 17 per cent that can be used occasionally but which should probably be permanent pasture. Four per cent has been described as Class V; it is mainly bottomland or muck. The remaining 14 per cent is rated as Classes VI and VII because of the steep slopes. No attempt was made to map them separately. This area - over 9,000 acres - should be used for pasture or forestry.

Factors used in assigning the various land classes are explained elsewhere in this report. In Tecumseth Township much of the land in the northern part is level enough for Class I, but drainage is a limiting factor and because of this these lands must be classified as II or III. In the southern portion, drainage is good, but steeper slopes and erosion hazard prevent full use of the land without conservation measures.

Township soils and the capability classes into which they most commonly fall are as follows:

| Soil | Class |
|---|---|
| Alliston | III |
| Bondhead | III, IV |
| Schomberg | III |
| Simcoe | III |
| Smithfield | II |
| Tioga | II |
| Tioga-Bondhead Complex | VI, VII |

Crop ratings for soils in Tecumseth are as follows:

| | |
|---|---|
| Alliston sandy loam | Fair to poor for oats, mixed grains, red clover, timothy, potatoes, pasture. Poor for wheat, alfalfa and corn. |

| | |
|---|---|
| Bondhead loam | Good for all grains, alfalfa, red clover, timothy and pasture.<br>Fair for corn and potatoes. |
| Schomberg silty clay loam | Good for all grains, alfalfa, red clover, timothy and pasture.<br>Fair for corn and potatoes. |
| Simcoe silt loam | Fair for oats, mixed grains, red clover, timothy, corn and pasture.<br>Poor for wheat, alfalfa and potatoes. |
| Smithfield silt loam | Good for oats, mixed grains, red clover, timothy, corn and pasture.<br>Fair for wheat, alfalfa and potatoes. |
| Tioga fine sandy loam | Good for potatoes, tobacco.<br>Fair for wheat, oats, mixed grains, alfalfa, red clover, timothy, corn and pasture. |
| Tioga loamy sand - Bondhead loam complex | Fair for oats, mixed grains, timothy.<br>Fair to poor for wheat, alfalfa, red clover, corn, potatoes and pasture. |

The 1961 Census shows that 72 per cent of the township population live on farms and that 88 per cent of the land is owned by 80 per cent of the farmers.

Of the total area (62,233 acres) of all farms, 83 per cent is designated as improved land, of which 63 per cent is under crops, made up of 16 per cent wheat, 30 per cent oats, barley and mixed grains, 30 per cent hay and 12 per cent row crops. Tecumseth leads all townships in the county in winter wheat and potato acreage with 20 per cent of the wheat and 33 per cent of the potato land. There are 934 acres of basic marketing rights of tobacco.

The remainder of the farmland is made up of 17 per cent unimproved land which is 7 per cent in woodland and 10 per cent idle, scrub or wasteland.

Tecumseth is second in the county in cattle numbers with about 9 per cent of the county total, second in sheep and third in hogs.

The reproduction of an aerial photograph of Tecumseth Township which accompanies this section shows:

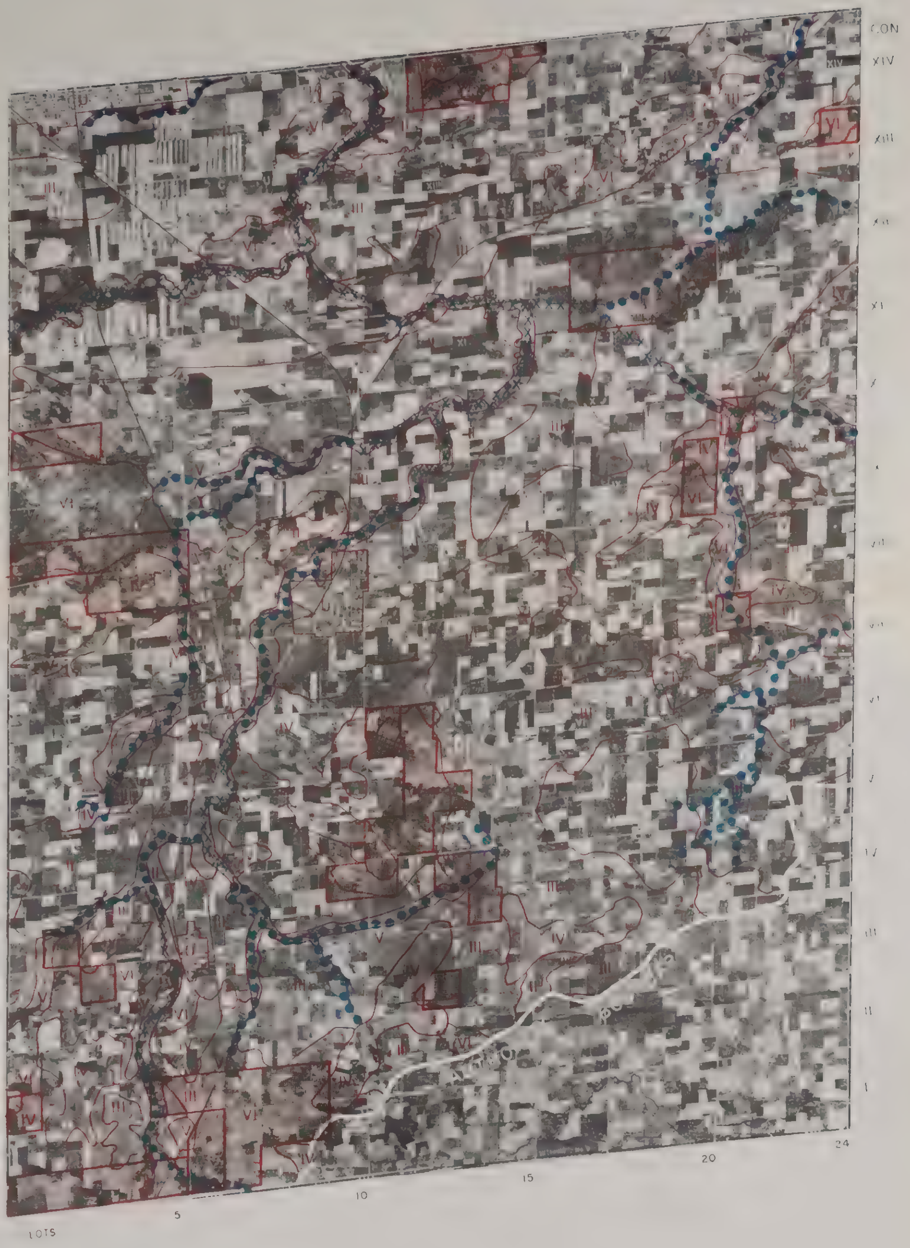
(a) Agricultural land capability for the township,

(b) Existing county and municipal as well as recommended Authority Forest land,

(c) Recommendations for stream improvement.

(a) <u>Agricultural Land Capability</u>

Because of the scale of the photograph, various units have had to be generalized in some areas; thus there may be small areas of another land class which




## TECUMSETH TOWNSHIP

### LEGEND

**LAND**

AGRICULTURAL CAPABILITY CLASSES

CLASS I Fully workable, no limitations
CLASS II Fully workable, some limitations.
CLASS III Fully workable, moderate limitations
CLASS IV Occasionally workable, severe limitations.
CLASS V Not usually workable
CLASS VI Unworkable - pasture or forestry.

**FOREST AREAS**

Existing Municipal Forest.
Existing County Forest
Recommended for Authority Forest

**STREAMS**

RECOMMENDED IMPROVEMENT MEASURES

●●●●● Vegetative
XXXXX Mechanical - Vegetative

SCALE : MILES

1 ½ 0 1 2 3 4

CONSERVATION AUTHORITIES BRANCH, Dep't E & R.M., T.L.L. 1964

have been too small to be shown. In areas shown as Classes VI-VII there are extensive areas of both classes which it is not possible to map and show separately.

(b) Forest Land

Existing county and municipal forests are shown. Other areas that, in the opinion of the conservation survey, should also be under forest cover are shown as recommended Authority Forest. These areas so recommended have been adjusted to existing property lines and hence may include small areas of otherwise workable land.

In addition to recommended areas, at least part of the capability Classes VI and VII should be in forest. There is need for owners of such land to undertake planting programs.

(c) Stream Improvement Measures

The problems and the value of measures which will improve fish habitat in streams and reduce bank erosion and silting are fully discussed in the Wildlife section of this report. The streams in the township have been examined and roughly classified as to effective improvement measures. These are shown on the photograph in two classifications: vegetative and vegetative-mechanical.

In each case it is assumed that stream sections should be fenced on either side of and back from each bank. This is to prevent further siltation of the streams in question and the breaking down of their banks by cattle. Provision for alternative stock water measures, such as by-pass ponds, will undoubtedly have to be made in some cases.

There are many cases where the simple measure of fencing will allow stream banks to stabilize themselves through the gradual invasion of natural vegetation.

Steeply banked and undercut sections are common on the streams of the township, particularly in the area where they cross the Tecumseth flats.

In such cases machinery may be used to grade these banks to an angle of repose, followed by the planting of various forms of vegetation, such as shrubs and low-growing trees. In the choice of shrubs for bank stabilization, some preference should be given to those shrubs which in addition to their primary values will also contribute valuable wildlife habitat for upland game and add aesthetically to the rural landscape. The species recommended are Purple-osier Willow, Silky Dogwood and Red-osier Dogwood. Where grassy cover is more suitable for the stream bank, Reed Canary Grass should be used.

Caution should be taken in the use of planted species of tall-growing trees, particularly in placing them far enough from the immediate water's edge. This is a means of guarding against the possible toppling of large mature trees in the future that may cause further bank damage. In addition, tree placement in planting should allow for a minimum of root encroachment into adjoining agricultural fields.

Structural devices for stream habitat improvement include small dams, deflectors and bank-cover producers along with combinations of the last two systems. Small dams have a tendency to silting above the dams and their best effects are frequently the erosive power of the water which pours over them. Deflectors and bank-cover devices are of two quite separate kinds and these are described and illustrated in the Wildlife section of this report.

2. <u>The Other Townships</u>

(a) <u>Adjala</u>

About 92 per cent of Adjala is in the drainage basin of the Nottawasaga. The main stream flows through Hockley Valley from Mono Township northeasterly across Adjala. Other tributary streams draining the township are Bailey and Sheldon Creeks.

The topography is generally rough and hilly. Elevations range between 750 and 1200 feet. More than 40 per cent of the soils are Tioga series or of the Tioga-Bondhead complex. They are sandy loams or fine sandy loams. Other soils occupying significant areas are Alliston sandy loam, Schomberg clay loam, Bondhead loam and Harriston silt loam. Lots 19-22 in Concession VII are occupied by a marsh which extends into Tecumseth Township. Parts of the marsh have recently been drained and are producing vegetables.

About 35 per cent of the township is suitable for regular cultivation and 14 per cent for occasional working. The remaining 51 per cent of the land should not be cultivated but kept under permanent grass or tree cover. The conservation survey showed some Class VI and VII land under cultivation. Since these areas are on the sandy Tioga soils, which are quite susceptible to erosion, the fields should be removed from cultivation.

The 1961 Census of Canada indicates that 64 per cent of the farmland is improved for cultivation, of which 34 per cent is in small grains. Most of the cattle are beef; there is little dairying.

(b) Essa

The whole of the township is in the Authority area. Physiographically, the western part of the township is within the sand plain on which Camp Borden is located. The easterly part is on a till plain. Elevations range from a low of 650 feet near Angus to a high of 975 feet on the top of drumlins in the south-east.

Bondhead sandy loam soil occupies over 30 per cent of the township, mainly in the eastern part of the township. Mixed with it are small areas of Smithfield clay loam, imperfectly drained. In the north and west part of the township, Tioga sand and sandy loam account for 17 per cent of the township area. There are small areas of Alliston sandy loam. There are two swamps along Bear Creek in the north-east part of the township. One of them, Barrie Swamp, is described fully elsewhere in this report.

Land use statistics for the township indicate that 56 per cent of the township is improved farmland of which 40 per cent is under crops and 12 per cent improved pasture. Over 60 per cent of the township farmland is regularly workable, 19 per cent only occasionally and 20 per cent non-workable.

About 25 per cent of the cattle population are for dairying. There are 2,500 acres of potatoes, 700 acres of corn and 371 acres of basic tobacco marketing rights.

(c) Flos

Lying across the north boundary of the Nottawasaga drainage area, 69 per cent of the township is within the watershed. Most of the township lies in the level Simcoe lowlands with elevations varying only from 600 to 725 feet. The eastern part of the township marks the beginning of the sand-hills and the Simcoe uplands, with elevations up to 950 feet. The low ridge which marks the shoreline of glacial Lake Algonquin runs behind Wasaga Beach and can be readily seen just west of the Wasaga Beach Golf Club.

Behind the Tioga sands that lie parallel to the beach is the Elmvale clay plain. The major soils here are the imperfectly drained Lovering clay and Wiarton clay loam and the poorly drained Minesing clay. These soils all need artificial drainage for productive agriculture. Considerable tile and open-ditch drainage has been done; there is need for more. A landscape feature in this area is Marl Lake, in Lot 20, Concession VII.

Soils of the higher eastern part of the township are generally well drained. They include Hendrie and Wyevale gravelly sands, Tioga, Vasey, Dundonald,

Bookton and Alliston sandy loams. Some of these soils have suffered severe erosion; much of the area has been reforested and a considerable portion should be returned to tree cover.

Statistics show that 73 per cent of the township is farmland of which 56 per cent is described as improved. Of the part of the township in the Authority area, 62 per cent is suitable for regular cropping, 8 per cent for occasional cropping and the remaining 30 per cent should not be worked up but should be in pasture or trees.

The main land use problems are drainage in the western portion and erosion in the higher lands in the Phelpston area.

(d) <u>Gwillimbury West</u>

One-third of this township lies within the Authority jurisdiction. Situated in the extreme south-easterly corner of the watershed, the remainder of the township is drained by the Schomberg River or by the many small streams flowing directly into Lake Simcoe.

The Cookstown flats occupy the north-west part of the township. Soil on the flats is mostly Alliston silt loam. Across the next several concessions to the south-east, the land rises over 300 feet and becomes quite hilly. Principal soils are Bondhead and Tioga with steep areas being mapped in each.

Of the part of the township in the watershed, 55 per cent is suitable for regular cultivation, 11 per cent occasional and 34 per cent unsuited to farm cropping. The land is mostly in general farming with large acreages of winter wheat. There are several sod farms on the flats.

Land use problems are mainly associated with the 34 per cent of the area mapped as Classes VI and VII, where slopes are steep and erosion hazard is quite high. This land should be in permanent pasture.

(e) <u>Innisfil</u>

Only 36 per cent of the township is in the Nottawasaga area. It is drained by a main tributary, Innisfil Creek. The rest of the township is drained by small streams flowing directly into Lake Simcoe.

That portion of the township in the watershed lies on a till plain known as the Simcoe upland. Its topography is rolling with elevations ranging between 750 feet in the Cookstown flats and 1,000 feet on Highway 27 south of Thornton.

The dominant soils are well-drained sandy loams, Bondhead, Dundonald and Tioga. There are some poorly drained and swampy areas along Innisfil Creek, the largest of which is Cookstown Marsh in the south end of the township. Part of this swamp has been drained and is being used for vegetable growing.

Undulating topography and the sandy soils make erosion a hazard; nevertheless, there is little evidence of serious erosion, a condition which is due apparently to the high level of soil management practised by most township farmers. About one-half of the area of the township in the Authority is Class III land capability. Classes IV and V account for 28 per cent and the remainder is Class VI and VII and not suited to cultivation. About one-third of the cattle population is dairy. The township has 20 per cent of the total poultry population of the county.

(f) Nottawasaga

Few townships in the Province have a greater range in elevation. The Georgian Bay shoreline is at the 600-foot contour while on top of the escarpment, above Collingwood, elevations range between 1,200 and 1,500 feet with several points around Singhampton reaching 1,700 feet.

The Niagara Escarpment passes through the township and the steep topography associated with it gives the great range in elevation. The south part of the township is drained by the Noisy River, a major tributary of the Nottawasaga. The township's north part is drained by a number of small streams, the Pretty, Batteaux and Silver, all of which flow directly into Georgian Bay.

Over 40 per cent of the township lies on or above the escarpment. Soils in the area are stony tills - Osprey loam and Dunedin clay closely intermingled and associated with Otonabee loam. Other soils along the escarpment include Farmington and Bennington loam and a strip of Burford gravelly loam which runs through Creemore and Avening. An extensive strip of well-drained Harriston loam and silt loam lies along the foot of the escarpment.

The clay plains below the escarpment contain such soils as poorly drained Parkhill loam, imperfectly drained Edenvale and Alliston sandy loam and Wiarton loam.

Tioga sand and sandy loam, Vasey sandy loam or an intermixture of the two series of soils occupy over 43 per cent of the township area.

The Town of Collingwood and a strip along the shoreline to the east lie on imperfectly drained Kemble loam. Because of the proximity of bedrock to the surface, this soil cannot be drained.

The topography of Nottawasaga Township gives it spectacular scenery with long views over Georgian Bay from many points on the escarpment. This has helped make the township increasingly popular in recent years as an area for "country estates" and homes. Farms, unsuited to agriculture because of poor soil or rough and steep land, often command a higher price on the real estate market for sale to urban residents than do nearby good farms. The hills have also brought extensive winter sports developments such as those at Devil's Glen and Osler Bluffs.

The better drained soils around Collingwood and Nottawa are used for fruit and vegetable growing. These soils include Tioga, Bookton, Sargent and Percy sandy loams, all well drained, and the imperfectly drained Berrien and Smithfield.

While occupying only a small area of the township, this fruit and vegetable development is perhaps the most significant industry in it. There are over 1,300 acres of tree fruits, made up of nearly 40,000 apple trees of which over 50 per cent are less than 10 years old, 20,000 cherry trees and over 100 acres of small fruits, mostly strawberries and raspberries.

Nottawasaga Township has 18 per cent of the county's cattle, mostly beef, 11 per cent of the county's hogs and 16 per cent of its poultry.

1961 Census figures show the township to have 71 per cent of its land improved, with 47 per cent of this area under crops and 21 per cent improved pasture. Less than half of the unimproved land is woods.

Land capability survey shows the township broken down as follows:

| | | |
|---|---|---|
| Class II | 3%) | fully |
| Class III | 30%) | workable |
| Class IV | 15%) | partially |
| Class V | 4%) | workable |
| Class VI | 45%) | not workable |

Nearly one-half of the township is not suited to agriculture and should be in tree cover or used for recreational purposes. Of the 16,000 acres of Class IV land, extensive parts now being cropped should be in permanent pasture.

Major land use problems are excess slopes, stoniness and erosion hazard.

(g) Oro

Willow Creek drains the one-third of Oro Township that is within the Nottawasaga Watershed. The most easterly township of the Authority area, it, like Innisfil and West Gwillimbury, lies mostly on the Simcoe uplands. Its topography is undulating to hilly, reaching elevations of over 1,100 feet along the sand-hills of

the watershed boundary. The major soils of that part of the township in the Nottawasaga are the well-drained Bondhead, Vasey and Tioga sandy loams and the imperfectly drained Guerin sandy loam. The sand-hills along the watershed boundary are mapped as a Tioga-Vasey complex. Stony areas are common.

The stony and steep areas are mapped as Land Classes VI and VII and account for nearly one-third of this part of the township. About 50 per cent can be cultivated regularly, being mostly Class III. Soils problems are associated with excess stoniness and with erosion hazard.

(h) Sunnidale

The whole of Sunnidale Township is in the Nottawasaga. It lies on the Simcoe lowlands and, compared to much of the rest of the watershed, its topography is quite level, with contours ranging between 600 and 725 feet. The whole township was once the bed of a glacial lake and the old beach lines of these lakes are to be found in several spots in the township. One of the most prominent runs behind Wasaga Beach through Concessions XII and XIII.

Tioga sandy loams account for over 23 per cent of the township soils. They are located in the north part adjacent to Wasaga Beach and in the extreme south. The Stayner flats lie around the Town of Stayner. They are made up of imperfectly drained Smithfield clay loam or a complex of poorly drained Berrien sandy loam and Simcoe clay. Common soils in the south-easterly part of the township are imperfectly drained Alliston silt loam and poorly drained Minesing marly clay. A small part of Minesing Swamp extends across the township line from Vespra.

General land capability classifications for the township are:

| Fully Workable | Occasionally Workable | No Cultivation |
|---|---|---|
| Class II - 14% | Class IV - 22% | Class VI-VII - 22% |
| Class III - 33% | Class V - 6% | |

Inadequate drainage is the most serious soil management problem. Open-ditch and tile drainage have been done on many farms, but much land still remains which needs artificial drainage before its full agricultural capability can be realized. Where undrained land must be used for crop production, it can often be used most profitably as improved pasture, using those species of grasses and legumes that are best suited to poorly drained soils.

Census figures for 1961 list over 60 per cent of the township as "improved" farmland, with 40 per cent in cropland. Twelve per cent of the township is woodland. The largest area of basic tobacco rights in the county is in Sunnidale - 1,430 acres.

(i) Tosorontio

The township is located in about the middle of the watershed and is drained by the Mad, Pine and Boyne Rivers. Camp Borden occupies the entire north-east quarter of the township. The topography of the township is undulating, sloping down from west to east. Elevations range between 950 feet in the extreme south-west to 700 feet in the north-east.

Most of the township lies in the sand plains of the Simcoe lowlands. Soils are generally sandy, with Tioga sandy loams and Tioga-Bondhead complex taking up over 46 per cent of the township. Other larger areas of soil are Bennington very fine sandy loam just north of Alliston, and Bookton sandy loam south of Glencairn.

There is 68 per cent of the township listed as improved farmland with over two-thirds of this being under crop. A substantial acreage of tobacco is grown - 1,080 acres of rights in 1962.

Breakdown of the township's land according to its agricultural capability shows the following:

| Fully Workable | Occasionally Workable | No Cultivation |
|---|---|---|
| Class I - 2% | Class IV - 15% | Class VI - 30% |
| Class II - 11% | Class V - 7% | |
| Class III - 35% | | |

(j) Vespra

Lying about the head of Kempenfelt Bay, 95 per cent of the township is drained by the Nottawasaga or its tributary, Willow Creek. The westerly part of the township was once inundated by a glacial lake and is part of the flats called the Simcoe lowlands. The eastern part of the township is on the Simcoe uplands. The dividing line between them is the shoreline of glacial Lake Algonquin, which curves north-easterly across the township. The Canadian Pacific Railway line follows the crest of this ancient shoreline right across the township.

Elevations in the lower part of the township range around 600 feet while in the uplands the 1,000-foot contour is reached in Concession VIII, Lots 16-18. Soils in the township are clearly associated with the lowland and the highland. In the low west part of the township, the Minesing Swamp covers some 13,000 acres. Around the swamp are the Minesing flats with its poorly drained Minesing clay soil. This soil has a high content of marl which makes it rather friable and allows the water to drain away more quickly than is normal in poorly drained soil. The flats are level and stone-free. Flooding is common along the river through the flats.

In the higher eastern part of the township, predominating soils are Tioga sandy loam and Vasey sandy loam or a complex of the two. These soils are well to excessively drained. Wind erosion was formerly a serious problem in this part of the township. However, much reforestation has been done on the most susceptible soils; the Midhurst Forestry Station and Hendrie Forest are examples.

Soil problems are drainage on the Minesing flats and low fertility and erosion on the uplands. There is still an acreage of erosion-susceptible soil that should be in tree cover. Grazing of pasture on the light rough land should be carefully controlled or the sod will become so thin that wind erosion can become serious.

Nearly 45 per cent of the township is "improved" farmland, and 13 per cent is woodland. Land capability ratings are as follows:

| Fully Workable | Occasionally Workable | No Cultivation |
|---|---|---|
| Class II - 15% | Class IV - 7% | Classes VI & VII - 51% |
| Class III - 25% | Class V - 2% | |

Of the cropland, about 7 per cent is in wheat, 43 per cent in bog and improved pasture, just under 4 per cent in ensilage corn and 3 per cent in potatoes. There are 255 acres of basic tobacco marketing rights.

(k) Mulmur

The major Nottawasaga River tributaries, the Boyne, Mad and Pine Rivers, drain all of the township. Its topography is rough, as the stream valleys have cut deeply or follow glacial spillways through the face of the escarpment. At some points these valleys have cut to a depth of 400 feet. Elevations around Honeywood reach 1,700 feet. The whole township slopes easterly, reaching the lowest contour at 800 feet in the Pine River valley in Concession VIII.

While the actual face of the escarpment is not always easily found, it is visible across Concessions III-V in Lots 23-32. The Pine River follows a spillway across the township, as does the Boyne for part of its course. Between the lobes of the spillways is till moraine.

The soils in this township are characteristic of the land along the escarpment - mostly well drained sands, sandy loams and loams. Large areas are mapped as soil complexes - two soils being found in close association. Over 40 per cent of the township is mapped in these soil complexes, Dumfries-Hillsburgh, Osprey-Dunedin and Tioga-Bondhead. Above the escarpment Honeywood silt loam occurs commonly, with smaller areas of Hillsburgh.

The topography and the soils of much of the township severely limit full cultivation and many of the lighter soils have suffered serious erosion over the years. Considerable reforestation has been done on them but serious erosion is still prevalent in some areas and these, too, should be in tree cover. Improved permanent pastures are called for in other areas to control erosion.

Only 18 per cent of the township is suited to regular cultivation, with most of this being in the west concessions above the escarpment. Another 18 per cent can be cultivated occasionally with great care; this is the class of land that can be best used for permanent pasture. A very large part of the township, 72 per cent, is Class VI and VII land and should never be cultivated.

Census figures show about 30 per cent of Mulmur in regular cultivation (as against only 18 per cent mapped as suitable for it) and 14 per cent in improved pasture. Considerable adjustment of land use to its capability is indicated as necessary.

General farming predominates in the township, with beef cattle most prominent. Cash crops are potatoes, 650 acres, and tobacco, 260 acres of rights. There is an extensive Christmas tree acreage.

(1) <u>Mono</u>

This township has 85 per cent of its area in the Nottawasaga, mostly drained by headwater streams of the main Nottawasaga. The township is slashed by deep glacial spillways between the areas of till moraine. The streams of the Nottawasaga flow through the spillways. The south-west corner of the township lies on a till plain and is characterized by many scattered areas of swamp and bog.

In common with areas along the escarpment, the topography is very rough, with elevations ranging from a high of 1,700 feet in the north-west to 1,000 feet in Hockley Valley.

Soils are generally light and well drained. About 57 per cent of the township is occupied by well drained Hillsburgh sandy loam or complexes of Hillsburgh sandy loam and Dumfries loam. A further 12 per cent is either Caledon fine sandy loam or Honeywood silt loam. Poorly drained areas of muck and bog account for 7 per cent of the township.

Soil management problems of most concern are erosion and steep slopes. Agriculture in nearly 60 per cent of the township is limited because of these factors and poor drainage. Only 25 per cent of Mono is suited to full cultivation and another 17 per cent to part-time cultivation.

1961 Census figures indicate 30 per cent of the township is used regularly for growing crops, 22 per cent is in improved pasture and 22 per cent is woodland, scrub or idle land. Agriculture in this township is mostly mixed farming, with 250 acres of potatoes as the only indicated special crop. Recreation is an important land use along the Hockley Valley with its ski slopes, cottages and city-owned country places.

(m) Melancthon

The headwaters of the Pine and Boyne Rivers drain 44 per cent of the township into the Nottawasaga Watershed. Lying on the till plain on top of the escarpment, the elevation is high, around 1,700 feet, but the topography is comparatively level. Nearly 15 per cent of the Nottawasaga part of the township is marsh or bog. Much of the rest is well drained Honeywood sand or silt loam and Caledon sandy loam. The major land use problem is drainage, which inhibits agricultural use of extensive areas of the whole township.

Melancthon Township is one of the major potato-growing areas of Central Ontario with about 2,000 acres used for this crop. Potatoes are grown mostly in the Honeywood soils, which are well drained fertile loams and excellent for such crops.

(n) Amaranth

Only 15 per cent of this township is in the watershed. It does contain the source areas of the main stream of the Nottawasaga. The soils, the soil problems and the uses of the land of this small part of the township are much the same as in adjacent Adjala.

(o) Collingwood and Osprey Townships

Only small parts of these Grey County townships are in the Nottawasaga Authority, 16 per cent of Collingwood Township and 27 per cent of Osprey.

The part of Osprey in the Authority is on the top of the escarpment, and it is mainly characterized by having about 50 per cent mapped as muck or marsh. The remainder of the soils are mostly well drained but stony Osprey loam and Harriston silt loam. Soil problems of this part of Osprey Township are erosion hazard, stoniness, steep slopes and drainage. The Harriston soils can be used with limitations for general agriculture, but most of the remaining drainage area should be in tree cover or permanent pasture.

In Collingwood Township, the headwaters of the Pretty River and other small streams included in the Nottawasaga Authority flow over the face of the

escarpment. Topography is rough and steep. The predominant soils are Osprey, Vincent clay loam and Dunedin clay. The slopes often limit agricultural use.

Areas of the marsh in Tecumseth Township on Bailey Creek west of Beeton have been cleared and drained for vegetable growing.

A meandering creek which is badly silted because of the trampling of the banks by cattle.

A section of a municipal drain. Raw banks contribute large amounts of silt which finds its way into ponds and the main stream.

Rolling hills characterize the landscape in the southern part of Tecumseth Township.

Class IV Tioga Sand in Concession VI of Tecumseth is recommended for reforestation.

The pond at Tottenham is a popular recreational spot for Township residents.

CHAPTER 7

# THE AUTHORITY AND A LAND USE PROGRAM

## 1. Land Use Programs of Other Conservation Authorities

Most of the Authorities in Ontario have promoted, at least to some degree, programs in soil conservation and land management. There is considerable variation, of course, in these programs - variations due to the topography and soils of the watershed and to the urgency of other problems.

Authorities regard measures to conserve and manage their soils and forest resources as basic to their overall programs. By their very nature, however, these projects are often less spectacular than the building of dams or the development of conservation lands for recreation.

In co-operation with the Department of Agriculture and other agricultural agencies and organizations, Conservation Authorities have undertaken a variety of projects in land management and soil conservation. Main features of these programs are summarized herewith.

### (a) Farm Ponds

Technical assistance and advice on the location, layout and construction of farm ponds are available from the staff of the Department of Agriculture, and the Government of Ontario makes a grant of 50 per cent of the cost up to a maximum of $500. Applications should be made to the Agricultural Representative.

### (b) Grass Watercourses and Tile Drainage

Three Authorities give assistance in the construction of grassed waterways on private land. Such assistance can be both financial and technical. Typical of such assistance is that offered by the Metropolitan Toronto and Region Conservation Authority, which offers a grant of half the cost of construction up to a maximum of $100 for each waterway. Waterways must be laid out by an agricultural engineer or other technician from the Department of Agriculture or from the Authority. The Metropolitan Region Authority also gives financial assistance for the installation of tile drainage and is the only Authority which offers this assistance. It pays $20 per thousand laid tile with a minimum and maximum of 5,000 and 10,000 tiles respectively per hundred acres per year. To qualify for assistance, the drainage plan must have been approved by an agricultural extension engineering specialist before the tiles were laid.

The Ausable River Conservation Authority has an assistance policy through which it gives technical and financial assistance towards the building of good outlets for farm tile drainage systems.

(c) Streambank Erosion Control

Five Conservation Authorities have carried on projects to combat excess erosion of banks of streams. These works have been of benefit in protecting both farm land and urban land as well as services and structures such as roads, sewers and bridges.

In some cases these projects have been for specific control of a threatened area; in others, they have been demonstrations of what can be done to control streambank erosion, often with quite small expenditures and simple measures.

(d) Demonstrations

One of the most effective ways of arousing interest in conservation farming and better land use practices is by demonstration. These demonstrations may be carried out in several ways.

One method is to agree with a private landowner to set up a demonstration on his property. This may be a farm pond, waterway, fenceline removal or gully control. The landowner may have the work done himself under professional direction and with some Authority financial assistance, or the Authority may do it for him. In either case, the landowner involved has a financial interest in the project, but allows it to be used as a public demonstration of a good practice.

Such projects have sometimes been a feature of a "Conservation Day" in which the Department of Agriculture and local farm organizations co-operate with the Authority in publicizing and sponsoring the event.

Many Authorities have purchased lands for conservation areas. Recreational developments bring large numbers of people to some of them. Such properties can be used for demonstrating various land use practices. These practices will vary depending on the topography and size of the area, but may very well include woodlot management, farm ponds, stream improvement, or pasture management.

Such demonstrations can be seen, for example, in the Albion Hills, Boyd, and Claremont Conservation Areas of the Metropolitan Toronto and Region Conservation Authority, and in the Grand Authority's Elora Gorge and Rockwood Conservation areas.

Several Authorities have acquired land for the specific purpose of demonstrating improved land use practices. The Grand Valley Conservation Authority

has established the 50-acre Oneida Demonstration Farm in the lower end of the Grand Watershed near Caledonia. On it the Authority has carried out gully control, pasture improvement and reforestation and has built a pond.

The Saugeen Valley Conservation Authority owns and operates the 100-acre Bell's Lake Farm. Located on land that is marginal for regular crop production, the Authority has established demonstrations of pasture rotations, seed and fertilizer mixtures and controlled grazing.

(e) Land-Judging Competition

An event becoming increasingly popular is the land-judging competition. In recent years up to 20 such competitions have been held annually across Ontario, with many being assisted by Conservation Authorities.

Primarily designed to interest and educate rural young people in soil and its management, the competitions also attract adult interest. The usual procedure is to have a morning of instruction, with the actual competition in the afternoon. Participants judge soils according to such factors as erosion hazard, drainage, stoniness, slope and suitability for various crops.

Authorities can co-operate by promoting the idea of such competitions and by offering some financial assistance towards the costs of sponsoring the event.

(f) Forest Conservation

A full discussion of forestry measures which Authorities can carry out is contained in the Forestry section. However, since forestry is an integral part of the management of the land resources of a watershed, a brief summary of the forest programs of other Authorities is given here.

Twenty-two Authorities have active forestry programs. These may be either (1) Authority acquisition of land for forest purposes or (2) encouragement of forest conservation measures on private land. These programs are designed to make better use of land that is submarginal for agriculture, usually areas that have a land capability rating of Class VI or VII.

Fourteen Authorities provide assistance to private landowners to carry out tree planting on their land. This assistance may include all or part of

a direct subsidization of private planting,

b provision of tree-planting machines, tractors and men to operate them,

c crews to hand-plant trees where machines cannot be used,

d a service to pick up trees at the nursery.

Costs to the landowner for these services vary between $5 and $12 per thousand trees planted, depending on the Authorities' policies and the amount of service provided.

Twenty-one Authorities have established Authority Forests. Properties which lie on land largely marginal or submarginal for agriculture are often best used for forest production. Private enterprise is often unable or unwilling to return large areas of such land to forest. It can frequently be done only under public ownership.

2. <u>A Program for the Nottawasaga</u>

Good management of the land resources of the watershed is essential to the well-being of all its renewable resources. Nevertheless, soil and forest conservation is often the least emphasized and least promoted part of an Authority program. This is largely due to the fact that land management is essentially the responsibility of private landowners. An Authority can purchase land and build water-control structures, develop conservation areas or authority forests. Such development attract attention by being easily seen and often visited. Measures to improve soil management are much less spectacular and usually receive less publicity. They must be carried out on private land and require the co-operation and interest of the landowner. This makes an effective land use and forest conservation program much more difficult to achieve.

The landowner's soil problems will be those associated with fertility, drainage and erosion. It is his responsibility to recognize any problems in soil management and he must be willing to take measures to correct them.

It is at the time he recognizes a soil management problem that the landowner is most likely to want technical assistance. He has soil maps and reports and the advice of technicians available to help him. He can get help from a government department, a representative of industry, from a neighbour, or perhaps from the Conservation Authority.

A Conservation Authority can, by itself, carry out only a very limited part of the soil management measures needed on a watershed. The Department of Agriculture and the Ontario Agricultural College are the agencies primarily responsible for advising farmers in their soil management problems. The agricultural representative and, through him, the extension specialists in soils, crops and engineering are available without charge to the landowner. They can assist and advise him on all manner of problems ranging from soil fertility to farm planning.

The Conservation Authority can promote a land management program most effectively by working with these agencies and their specialists. The soils and land use program of an Authority should complement existing programs and services. Authorities are sometimes able to provide facilities or funds to agricultural specialists which are not otherwise available to them.

Any conservation program must deal first with people before it deals with land. This is particularly true of soil and forest conservation. The Authority can be most effective by developing a program which interests, informs and demonstrates to landowners the benefits and advantages of good land use practices. To a smaller extent the Authority may promote soil conservation by giving limited financial assistance to such practices as drainage outlets, grass waterways, and tree planting.

Improving the use and management of the soil is essentially an educational process. It must be long-range and is often very slow. It is influenced by both economic and social factors which are outside the control and jurisdiction of the Authority. Nevertheless, the use and condition of the soil in a watershed are basic considerations in the management of all the renewable resources. Unless the condition of the soil is good, and the practices used in its management are sound, all the other parts of a watershed conservation program will be less than worthwhile.

The following suggestions are made for measures which the Nottawasaga Valley Conservation Authority should consider in a land use program. These suggestions are made in light of the data collected in the conservation survey and having in mind the needs of the watershed and the abilities of the Authority.

(1) Forestry is a function of a land use program and, since forestry and agriculture are both concerned with the use and management of private land, the forestry and land use program of the Authority could well be carried out under the same Advisory Board.

(2) The Authority should promote interest in improved soil management practices by giving limited financial assistance in the form of grants toward construction of grass waterways, gully and erosion control, drainage outlets, and other approved practices.

(3) Demonstrations of various practices such as reforestation, gully control, grass waterways, pasture renovation and improvement, farm ponds and streambank erosion control can be carried out in several ways:

a on Authority conservation areas, combined with recreational use of the land,

b on property acquired specifically for demonstrating a practice,

c on privately owned land as a co-operative project between the landowner and the Authority. (For example, the Authority might give a landowner limited financial aid to establish a grass waterway in return for the right to use the project as a demonstration.)

(4) The Authority should encourage land-judging competitions by giving financial assistance to local Junior Farm and 4-H Club organizations through the Department of Agriculture.

(5) The Authority should encourage streambank erosion control by undertaking demonstrations on Authority land, or by assisting private landowners with demonstration projects.

(6) Tours, exhibits, publications and field days featuring good land use practices in contrast with unsatisfactory ones are useful methods of promoting interest.

(7) The Authority should co-operate extensively with all local farm organizations to promote and advance interest in conservation and good land use management.

(8) The Authority should request the Agricultural Representatives and the District Forester in the Lake Simcoe District, Department of Lands and Forests, or their representatives, to be members of the appropriate Authority Advisory Boards.

## WATERSHED SOILS:

## THEIR CAPABILITY AND LIMITATIONS FOR GENERAL AGRICULTURE

| Soil Series | Characteristic Capability Class | Main Limitations |
|---|---|---|
| Honeywood sandy loam | I & II | |
| Embro sandy loam | II | Drainage |
| Edenvale sandy loam | II | Drainage |
| Listowel loam | II | Drainage |
| Bookton sandy loam | II & III | |
| Tioga sand | III | Fertility, erosion susceptibility |
| Alliston sandy loam | III | Drainage |
| Bondhead sandy loam | III | Erosion susceptibility |
| Bennington sandy loam | III | Erosion susceptibility |
| Donnybrook sandy loam | III | Erosion susceptibility |
| Dundonald sandy loam | III | Erosion susceptibility |
| Wiarton loam | III | Drainage |
| Burford loam | III | Erosion susceptibility, fertility |
| Smithfield clay loam | III | Drainage |
| Vasey sandy loam | III & IV | Erosion susceptibility |
| Hillsburgh sandy loam | III & IV | Erosion susceptibility |
| Harriston loam | III & IV | Erosion susceptibility |
| Schomberg clay loam | III & IV | Erosion susceptibility |
| Minesing clay loam | III & IV | Drainage |
| Granby sandy loam | IV | Drainage |
| Sargent sandy loam | IV | Erosion susceptibility, stones, droughtiness |
| Simcoe clay | IV | Drainage |
| Tioga (stony or steep phase) | IV & VI | Fertility, erosion susceptibility, steep slopes |
| Osprey loam | IV & VI | Fertility, erosion susceptibility, stoniness |
| Farmington sandy loam | IV & VI | Shallow soils, droughtiness |
| Dunedin clay | VI & VII | Erosion, steep slopes |
| Wyevale sandy loam | VI & VII | Erosion susceptibility, droughtiness, stones |

## PRELIMINARY SURVEY OF TWO SWAMP AREAS IN THE NOTTAWASAGA WATERSHED

Preliminary surveys were carried out in two areas which have been considered as having some potential for muck farming operations. They are the Innisfil Swamp and the Barrie Swamp.

The Innisfil Swamp is located between Highway 400 and Highway 11, south-west of Churchill, on Innisfil Creek. The longest part of the swamp lies in Innisfil Township, but a small part at the southern end extends into West Gwillimbury.

The Simcoe County soil map indicates that the Innisfil Swamp covers an area of about 2,200 acres. This includes areas covered with muck to a depth of one or more feet. The swamp is the longest and deepest of a chain of three - Bailey Creek, Randall Station, Cookstown - lying over a narrow sand plain and bounded on both sides by rolling deposits of loamy tills.

Underlying the muck in the Innisfil Swamp is a shallow layer of silt-like material about 2-4 inches deep over sand. Where the muck was over 4 feet deep, the bottom 12-15 inches consisted mainly of decayed brownish masses. On top of this deposit was 3-5 feet of black organic material. Where the total muck depth was less than 4 feet the brown-coloured layer was not evident and the entire depth of muck was uniform in colour. From soil borings and observations in open ditches it was noted that many pieces of partially decayed trees were found in the upper layers at depths of 1-3 feet.

Present vegetative cover is mainly one of low-quality forest consisting of poplar, elm, maple, cedar and alder. Tall grasses and weeds have taken over some old clear areas.

The survey was carried out by taking soil borings with a six-foot soil auger at random points in the swamp and in open ditches along the roadsides. No attempt was made to determine the exact depth of the deposits in view of the fact that the purpose of the survey was only to arrive at some indication of the acreage of muck deposits of four or more feet in depth. The locations and depths of the borings have been plotted on a map (scale 4 inches = 1 mile). An area which has deposits apparently of 4-foot depth or more lies between the Innisfil-West Gwillimbury town line and the road between Concessions II and III of Innisfil. It is roughly triangular in shape with the base lying along the concession road and the

tip or apex of the triangle being located just south of the town line. To the south and west the muck layer appears to become shallower, producing a broad area with a depth of 1-2½ feet. North of the road between Concessions II and III, the muck grades into silty clay loam. Eastward, the muck deposit grades sharply out to loam and sandy loam. There appear to be about 850 acres of muck 4 feet deep or more, plus an additional 300 acres about 3 feet deep.

At present, the main muck farming operations along the town line are being carried out on deposits about 30 inches deep. Successful farming here appears to be governed by drainage, with which there are some problems due to inadequate maintenance.

Ditches have largely been restricted to those along the roadsides, with the exception of some carried out along the Innisfil Creek and by private operators in isolated locations.

The Barrie Swamp covers an area of about 1,600 acres on the upper waters of Bear Creek. The swamp lies immediately south of Highway 90 and is bisected by the Innisfil-Essa town line. A small part of the swamp extends north of the highway into Concession VII of Vespra Township. A single-line C.N.R. track runs through the northern part of the swamp parallel to Highway 90.

In general, the muck deposits are shallow and patchy, with series of sand knolls alternating with muck-filled depressions. The muck lies directly on the sand. The entire swamp lies on a poorly drained sand plain.

The same survey technique was used here as was applied to the Innisfil Swamp. About 160 acres were found to be of 4 or more feet in depth. This area is located east of the town line, between the railroad track and the sideroad in Concession XIV of Innisfil. Due to the undulating nature of the sand, it is doubtful if all the muck in the area is more than four feet deep. However, the survey was not intensive enough to plot these variations.

In addition, there were about 175 acres of muck more than 3 feet deep, surrounding the 4-foot-deep area. A large part of it lay to the east between the railway and the highway, as well as north of the highway. The remainder of the muck ranged in depth from 2 feet to less than 6 inches, including that in the half of the swamp in Essa Township.

## Conclusion

This survey was inconclusive, as random samplings did not provide enough data to substantiate recommendations for future planning. It was sufficient

to point out that an intensive "grid" survey of the muck deposits should be carried out prior to the formulation of any firm policies with respect to the two areas.

Additional information that should be obtained at the same time would include:

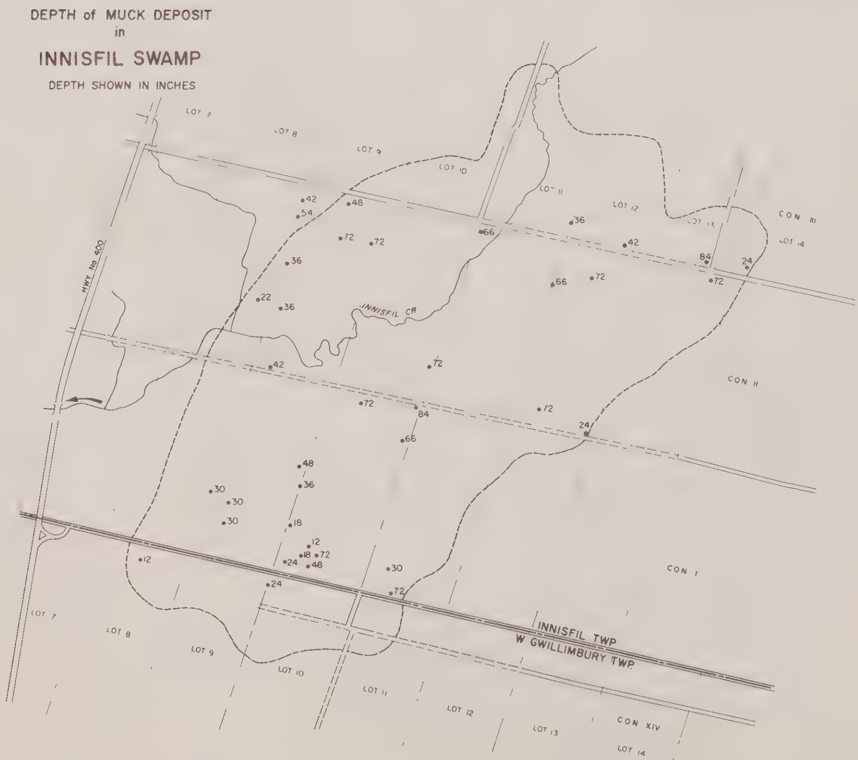
(1) Costs of land clearing under different types of cover.

(2) Survey of drainage needs for both swamps.

(3) Estimated costs of adequate and permanent drainage facilities.

(4) The study of areas not suitable for muck farming - to be integrated with Authority Forests after necessary provisions have been made for clearing, draining and developing of the farm lands.


DEPTH of MUCK DEPOSIT
in
BARRIE SWAMP
DEPTH SHOWN IN INCHES
BARRIE
VESPRA TWP.
INNISFIL TWP
ESSA TWP
HWY No 90
BEAR CR
CNR
CON VII
CON VIII
CON IX
CON X
CON XI
CON XIII
CON XIV
LOT 22
LOT 23
LOT 24
LOT 32
LOT 31
LOT 30
LOT 29
LOT 28
LOT 1
LOT 2
LOT 3
LOT 4
SCALE FEET
1320 0 1320 2640 3960
L & F CONSERVATION AUTHORITIES BRANCH 1964 C S V


DEPTH of MUCK DEPOSIT
in
INNISFIL SWAMP
DEPTH SHOWN IN INCHES
HWY No 400
INNISFIL CR
INNISFIL TWP
W GWILLIMBURY TWP
CON III
CON II
CON I
CON XIV
LOT 7
LOT 8
LOT 9
LOT 10
LOT 11
LOT 12
LOT 13
LOT 14

# FORESTRY

## CHAPTER 1

## THE FOREST IN THE PAST

### 1. At the Time of Settlement

A reasonable description of the early forests can be obtained by referring to the notes of the original surveyors, who laid out the townships within the Nottawasaga River Watershed in preparation for settlement. Their instructions were:

> "Your field book is to be kept in the accompanying form, comprising the kind and quality of the soil and timber, entering such kind of timber in the order of its relative abundance."

The constantly repeated observations of certain forest species under distinctive site conditions during the original survey give us a good idea of the forest cover in the early 1800's. Generally speaking the best land on the Nottawasaga River Watershed supported stands of maple, beech and basswood with inclusions of elm, birch, cherry and oak.

Lowlands in most cases were swamps covered with elm, cedar, tamarack, black ash, or combinations of these species.

#### (a) Southern Region

Hemlock, not pine, appears to have been the most consistently observed coniferous constituent of the forest on the high rolling headwaters regions of the watershed. White pine and red pine were, however, the principal coniferous species on the dry flat sections of the "Simcoe Lowlands".* In addition the main Nottawasaga River, together with the lower reaches of its tributaries, flowed through large swamps which were also an important constituent of the flattened central valley of the watershed. Cedar, tamarack, elm and black ash were the most commonly noted tree species during the original survey when it crossed these vast wet areas.

Tecumseth, a southern headwaters township, had a typical upper slope forest of maple, beech, basswood, elm and hemlock in the region containing Concessions I - III. Pine was present, scattered throughout the forest on good land near the present site of Tottenham Village. The usual maple, beech, elm and hemlock forest covered the eastern part of the township where the countryside rises again out of the central valley of the Nottawasaga. This forest continued into the uplands of West Gwillimbury and, in the other direction, throughout the southern and north-western uplands of Adjala Township.

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* Putnam & Chapman, "The Physiography of Southern Ontario".

Hemlock was observed by the surveyor of Adjala, in pure stands, on Lot 15 on the line between Concessions IV and V, and Lot 11 on the line between Concessions V and VI. There was some evidence of pine as an integral part of West Gwillimbury's upland forest where it overlooked the "Simcoe Lowlands". Here hemlock appeared on ridges and as a constituent of the normal maple, beech, elm forest on the area now known as "The Hollows".

Both red oak and white oak appeared as scattered individuals in this township.

The swampy southern limits of the "Simcoe Lowlands" cross the northern sections of both West Gwillimbury and Tecumseth, joining, on their western edge, with a former glacial outlet that crossed the northern part of Adjala. All of this swamp land sustained cedar, tamarack, fir and black ash in abundance. Pine appeared in its eastern sections as a scattered inclusion of the great swamp forest along Innisfil Creek.

(b) Escarpment Region

The southern escarpment region of the watershed is a countryside of irregular relief in both Mono and Mulmur Townships, broken by the pre-glacial valleys of the Nottawasaga, Boyne and Pine Rivers, and by Sheldon Creek. The sources of these streams are located in Amaranth and Melancthon Townships, where the topography becomes gradually more gentle towards the area of the headwaters. The forest of this region was once more a typical maple, beech, elm and basswood combination on the hills and cedar, tamarack, spruce, fir and birch in the valleys and on lowlands, particularly towards the headwaters of principal streams. Hemlock, the chief conifer in Mono Township, was also observed as an important forest constituent on the edges of moist areas and in some cases within the lowland swamps themselves. Pine was observed at infrequent intervals in Mono as at Lot 7 on the line between Concessions I and II west of the "street of communication " (Hurontario Street), Lots 2, 22 and 23 on the west boundary, and on Lot 32 of the line between Concessions I and II, east of the street of communication.

However, in Mulmur Township, although the general forest description was similar to that of Mono Township at the time of survey, pine was much more prominent, principally east of the street of communication.

These observations of pine by the surveyor in Mulmur can be listed as follows:

| Lot Numbers | Survey Line of 1821-1822 Between Concessions |
|---|---|
| 1. Lots 3,19,21 | III & IV |
| 2. Lot 22 | IV & V |
| 3. Lots 19,20,21,22,23,24 | V & VI |
| 4. Lots 1 to 14 | VI & VII |
| 5. Lots 18 to 22 | VI & VII |
| 6. Lots 17 to 26 | VII & VIII |

The region that became Osprey Township is perhaps best described as a transition between the headwaters territory to the south and the Blue Mountains region to the north. There was a great soil variation from good clay to stony and gravelly land. The source water swamps were smaller in the rougher sections. The forest cover in these swamps did not differ greatly from that in any other part of the watershed, but pine appears not to have been a forest constituent here. Hemlock was also less noticeable. A pure hardwood forest of maple, beech and elm was evidently the standard cover on the best lands. This is borne out by C. Rankin's report of The Survey of Osprey and Artemesia Townships:

> "The surface generally of the Eastern part of Ospry is rough & broken; of the Western part more level and better adapted for cultivation. The soil mostly is limestone gravel, mixed, more or less, in different parts, with good clay loam; in the middle and Eastern parts loose boulder stones prevail on the surface to a considerable and inconvenient extent.
>
> "The timber is of the various kinds of hardwood - as Beech, Maple, Elm & c. together with Cedar, Tamarack & c, on the flat land and swales."

It is interesting to note that the surveyor encountered settlement clearings south of the proposed Durham Road Line and on Lot 4 of Concession A.

Collingwood Township (originally called Alta) and the west part of Nottawasaga Township are best described by quoting from Rankin's report of 1833:

> "The tract comprised within this survey may in general be described like the Township of Nottawasaga, except that on the West, the descent of the Blue Mountain is much more gradual than on the east - it is, like Nottawasaga, generally Excellent Soil, having a Clay bottom and covered with the same kind of timber, Viz. Maple, Basswood, Beech, Elm etc. - it is also like Nottawasaga, extremely well supplied with living Streams of pure water having their source in the mountains above mentioned.
>
> "The shore is generally Stony, - in front of the East part of 'Alta' there are some shoals extending a considerable distance into the Lake which in front of the other parts of this Survey deepens very gradually and is beautifully transparent.
>
> "From the shore inland for from 1/4 to 1/2 a mile (in 'Alta') is a hard gravelly Flat - Like that described in Nottawasaga and covered with a similar close growth of small evergreen wood - immediately behind this Flat in the space between the 2nd and 7th Cons. of the Township last mentioned ('Alta') give rise rather suddenly the north point of the mountain, and within this space also the country as far back on Southly

as No. 24 is to much broken by deep Ravines etc. as to be rendered in many places unfit for cultivation - .

"To the Westward of the 6th Con. the ground rises more gradually and also to the Westward of that Concession there is in rear of the gravelly flat above mentioned a sandy tract with Beech & Maple timber extending back an average depth of a mile - behind this last, and extending to Southern limit of the Township, the bottom is clay with, in general, a very excellent soil -

"The course of the highest level of that part of the Blue Mountain which is within the Township of Alta is nearly the same as the Con. lines - that level (the Summit) therefore keeps pretty much between the Cons. before mentioned viz. the 2nd and 7th all the way to the Southern limit of the Township and includes a great deal of very superior Soil, tho' the southern part, as is also the case with the same part of the 8th, 9th and 10th Cons. is a good deal infested with stone."

Though not much of Collingwood Township is in the Nottawasaga Conservation Authority, this quotation does give a description of the forest in the important escarpment area of the Authority above Georgian Bay.

Hemlock once more made its appearance in the uneven or "broken" areas of Nottawasaga Township, in the hilly sections up against the main escarpment on the southern boundary. This was as an inclusion mainly in the usual predominant maple, beech, basswood and elm forest. Pine, as an inclusion in the maple-beech association, was also generally observed in the flattened sandy eastern half of the township. This was a common notation during Kelly's survey of the township in 1832.

It should also be noted that those parts of this township bordering on Georgian Bay described as "gravelly flat land" during the original survey supported only a scrubby series of bushy cedar, tamarack, poplar or birch "thickets". With the exception of the addition of urban buildings, this situation is unchanged today, as the site is unfavourable for the growth of first-class forest trees.

(c) Simcoe Uplands Region

That part of this region that is within the watershed is contained mainly in Innisfil, Oro and Medonte Townships, with one small area in Vespra Township. Once again the common forest was maple, beech, elm and basswood, with hemlock inclusions. Pine was also a common species on the western slope of Innisfil Township and the rolling land of the other three townships. Lowlands as usual supported cedar, tamarack and black ash swamps. It should be noted that in these areas neither pine nor hemlock was as common as the hardwood species.

The area of the boundary between Innisfil and Vespra Townships was a large cedar and tamarack swamp, the remnants of which can still be seen today, although no longer as purely coniferous.

(d) Central Region

It is in this region of the watershed, the section contained in the "Simcoe Lowlands," that pine, particularly white pine, attained the stature of a principal species.

In Essa Township, pure stands of pine were to be found on what is now the Camp Borden area. In other parts of the lowlands in this township, however, there is no evidence of large pure stands of pine in the original survey notes. Mixed in with smaller pine stands were scattered areas of cedar swamp. Good land had the usual maple, beech, basswood, hemlock and elm on it. Hemlock and pine stands grew on the poor land adjoining the main river itself. On the uplands to the east, good land was covered with the maple-beech complex, with some scattered pine as stand inclusions. Two large cedar swamps also covered low flat sections of the drainage of Innisfil Creek and the entire north end of the township on the drainage of Bear Creek. In the latter area there were places that could not be crossed by the original surveyor in 1820, due to flood conditions. It should be noted that the former swamp area of lower Innisfil Creek still floods regularly in the spring but is not considered a particular problem by local farmers.

In Tosorontio, pine attained greater prominence, being an important inclusion of the maple, beech and hemlock forest, in the boundary region next to Mulmur Township. Gradually the forest changed toward pure white pine as the land flattened towards the east. Pine was either a major constituent or the only species in most of Tosorontio's forest cover, with the exception of some of the cedar swamps. Poplar also was of some importance as a forest species in this township.

Forest cover in Sunnidale and Vespra Townships was very much controlled by the size and proximity of the great swamp stretching over the countryside from the main Nottawasaga River, that is now called "Minesing Swamp". Every conceivable combination of black ash, tamarack, cedar, elm and willow forest plus other species could be found in this great swamp. Open flooded areas and swamp meadows were also common.

In Sunnidale, it is notable also that as the land rose to the west and north-west from the swamp the combination of maple, beech, basswood and hemlock, common to other parts of the watershed, changed to include pine as a common included species of the forest. This was perhaps more in the form of patches of each species combination, together with small areas of the usual swamp forest.

The region drained by the Mad River where it flows into the main

Nottawasaga was covered with a series of tamarack, cedar, spruce and birch swamps. There were also areas of "good meadow ground". This has changed considerably since the original survey. The cover on this area is presently a hardwood forest, mainly of silver maple, elm and ash.

During the survey in 1879 by Henry Creswick, Jr., frequent notation of the clay soil alluvial deposits and the areas experiencing "inundation" was made. He also observed the same type of forest as that of the survey of 1833.

Creswick noted the presence of "whitewood" on the area between the first forty and fifty chains from the north-east corner of Lot 19, Concession VII, on the boundary between Sunnidale and Vespra Townships.

This surveyor's excellent map shows that the "whitewood" was the primary species in "heavy dense woods" with balsam and cedar. The same map shows the same species as occurring on the lot immediately to the east in Vespra Township (Lot 6, Concession XIV). In this case it was considered the third species in importance in a "heavy dense woods" of balsam, cedar, whitewood and pine.

A similar observation was made in the headwaters of the Credit River near the Nottawasaga height of land. In this case the "whitewood" was noted as an inclusion of a maple, beech, hemlock, birch, pine and cherry forest, on the survey of the boundary between Amaranth and Mono Townships, at 6 chains and 50 links north of the south boundary of Lot 6. It is difficult to believe that these observations refer to the tulip tree, the one usually intended by the term "whitewood", but if they do they constitute a definite northern extension of its known range.

Vespra Township's forest cover was similarly influenced by the presence of the Minesing Swamp over a large part of its lowland area. Cover in the swamp was described as cedar, tamarack, spruce, black ash and willow. Swamp meadows, bogs and areas of deep water were common. As the land rose on all sides smaller wet-site patches of cedar and fir were scattered throughout a forest of maple, elm, beech and basswood with pine and hemlock inclusions. This forest continued into the township's highlands.

Flos was considered to be a rather poor region, from both the forest and soils point of view. Large sections of its western parts in the neighbourhood of the Nottawasaga River were wet and swampy. Lots 6 to 14 in the line between Concessions IV and V were considered

> "unfit for cultivation - not laid out. conceived from No. 14 to be at first a continuance of wet land and conceived from Conc. 3rd to 4th to be connected from No. 6 to No. 14 with wet and Swamp Land."

The forest cover was correspondingly patchy and variable. Small

pineries were found on sandy soil such as on Lot 2 between Concessions V and VI. In addition small areas of maple, beech, basswood and elm were found on clay soils with hemlock and pine inclusions. Areas of cedar, tamarack, spruce and fir were common.

The rolling hills of Oro and the little section of Medonte in the watershed were covered mainly with the usual maple, beech, basswood mixture. Birch, hemlock and pine also appeared to be important forest constituents. Pine in mixture with other species was common on "plains" as on Lot 8 of the line between Concessions III and IV.

2. Clearing the Land

The efforts of many previous investigators into the history of the Lake Simcoe and Georgian Bay region indicate that North Simcoe was occupied by the Huron Indian tribes until their virtual extermination by the Iroquois in 1648 to 1650. These tribes were farmers, hunters, and fishermen. Champlain in 1615 found them growing corn, squash and sunflowers and using the trees, shrubs, animals and birds of the forest to provide meat, fruits, clothing, medicines and building material.*

After the Iroquois massacres, the countryside reverted entirely to forest, being occupied only by sparse populations of Ojibway Indians who used the forest as a hunting ground.

Settlement, though slow, began between 1795 and 1835, spreading into the region from the counties to the south.

These settlers encountered an almost unbroken forest of the highest quality. Great stands of pine were met with on the sandy plains. Many of these pine plains undoubtedly were the result of fire, since such pure stands rarely occur naturally except following a fire. D. P. Drysdale, in his thesis on the Forest Industry in Simcoe County, found that white pine was ten times more plentiful than red pine on these plains, but that in the early cutting the settlers of European origin showed a preference for red pine since it more closely resembled the lumber they were familiar with in Europe.

However, Samuel Thompson, in his "Reminiscences of a Canadian Pioneer", states that many of the hardwood stands along the Nottawasaga River

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* "Land Use in the Townships of Tiny, Tay, Flos and Medonte in Simcoe County" published by the division of Timber, Ontario Department of Lands and Forests.

appeared to have been much older than the pine, indicating the existence of at least an equally important hardwood forest.

The usual course of settlement in Ontario was followed on the watershed, involving the destruction of much of the forest as rapidly as possible to make way for agricultural crops. The hardwood, particularly, found little market despite its high quality, and was normally skidded into large piles and burned during winter and spring when the fire hazard was low. Some settlers hired themselves out as clearing contractors and often claimed that they could clear as much as an acre of land of its forest cover in one day. There was a rather limited market for potash which some of the early pioneers took advantage of. The smaller logs, especially pine, were used to build log homes.

3. Forest Products

The earliest interest in timber in Ontario was the reservation of pine and oak either by specified areas or by individual marked trees for the use of the British Navy. The square timber trade, which commenced somewhat later, was carried on simultaneously with the mast trade from the 1830's and was likewise very selective as to species and quality.

Square timber was obtained by selecting large trees, mostly white pine, and squaring the best part into one long stick. In the earliest days of the industry the timbers were squared on all four sides to a fine "proud edge" but later, when the best timber had been cut, they were squared with a rounded shoulder or "wane" and were known as "waney timber". Such methods, of course, were wasteful since the finest grained wood was sacrificed in the operation, but this was the type of material called for by the British market.

> "Often only one tree in a thousand would yield a finished 'stick' (so was the heavy square timber nonchalantly called in the trade) fit for export. A good stand might yield 30 or 40 trees an acre for over the whole area allowance had to be made for 'wants' - the non-bearing patches of swamp burn, etc. Today a whole township or limit (in Northern Ontario) may not have one good square stick of the quality of the square timber of another day."*

During this period, evidence that the best white pine did not necessarily occupy the pine belt of the "Simcoe Lowlands" is found in Andrew F. Hunter's "A History of Simcoe County", when he refers to a pine mast in Innisfil Township 118 feet long, which required 14 teams to draw it to a railway.

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* "A Hundred Years A-Fellin'", written for Gillies Brothers Limited by Miss Charlotte Whitton.

FOREST PRODUCTS
ESTIMATED FROM CENSUS OF CANADA FIGURES
DUFFERIN COUNTY

| Products | Species | Unit | 1870 | 1880 | 1890 | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pulpwood | | Cords | | | 141 | | | | 35 | 10 | | 5 |
| Tanbark | | " | 818 | 1,254 | 1,933 | 424 | 65 | | | | | |
| Lathwood | | " | 32 | 1,727 | 1,471 | | | | | | | |
| Masts & Spars | | Number | 200 | 4 | 14 | | | | | | | |
| Staves | | " | 1,130 | 987 | 1,145 | $639 | $160 | | | | | |
| Fence Rails | | " | | | | | | 2,005 | 1,175 | | | |
| Fence Posts | | " | | | 90,746 | 26,002 | 5,032 | 1,432 | 5,588 | | 5,699 | 9,786 |
| Poles | | " | | | 3,064 | 1,368 | 730 | | 530 | | 57 | 14 |
| Railway Ties | | " | | | 582,485 | 3,723 | 3,930 | | | | | |
| Fuel Wood | | Cords | 159,598 | 194,618 | 173,954 | 116,651 | 46,820 | 45,500 | 31,691 | 23,338 | 10,834 | 4,424 |
| Square Timber & Logs | Ash | Cu.Ft. | | | | 6,379 | 12,130 | | | | | |
| | Birch & Maple | " | 4,230 | 21,325 | 116,140 | 15,955 | 1,700 | | | | | |
| | Black Walnut | " | | | 800 | | | | | | | |
| | Butternut | " | 8,000 | 20 | 1,100 | | | | | | | |
| | Elm | " | 149,390 | 218,012 | 233,916 | 77,968 | 12,112 | | | | | |
| | Hickory | " | | 1,480 | | | | | | | | |
| | Oak | " | 2,760 | 780 | 5,029 | 1,028 | | | | | | |
| | Hemlock | " | | | | | | | | | | |
| | Pine | " | 27,190 | 43,007 | 11,652 | 5,000 | | | | | | |
| | Spruce | " | | | | | | | | | | |
| | Tamarack | " | 124,100 | 85,234 | 163,409 | | | | | | | |
| | Others | " | 425,869 | 638,380 | 160,269 | 55,023 | | | | | | |
| Lumber | Pine | M Bd.Ft. | 2,067 | 14,604 | 3,220 | | 1,676 | 661 | 1,408 | | 39,279 | 741 |
| | Others | M Bd.Ft. | 7,537 | 116,537 | 70,027 | 5,894 | | | | | | |
| Other Products | | Value $ | | | | | | 20 | 657 | 10,646 | 1,665 | 2,895 |

FOREST PRODUCTS
ESTIMATED FROM CENSUS OF CANADA FIGURES
GREY COUNTY

| Products | Species | Unit | 1870 | 1880 | 1890 | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pulpwood | | Cords | | | 464 | 235 | 304 | 707 | 178 | 412 | 92 | 249 |
| Tanbark | | " | 960 | 879 | 3,485 | 1,260 | 206 | | | | | |
| Lathwood | | " | 55 | 353 | 192 | | | | | | | |
| Masts & Spars | | Number | 60 | 351 | 477 | 1 | 4 | | | | | |
| Staves | | " | 543 | 460 | 986 | $3,585 | $4,905 | | | | | |
| Fence Rails | | " | | | | | | 11,950 | 10,688 | | | |
| Fence Posts | | " | | | 254,681 | 53,728 | 26,587 | 29,729 | 19,060 | | 51,879 | 77,995 |
| Poles | | " | | | 34,785 | 3,085 | 5,988 | 1,379 | 1,901 | | 2,291 | 395 |
| Railway Ties | | " | | | 15,934 | 33,286 | 23,759 | 18,136 | 6,716 | | | |
| Fuel Wood | | Cords | 186,935 | 268,818 | 246,340 | 140,804 | 147,851 | 129,533 | 129,533 | 87,553 | 48,860 | 26,632 |
| Square Timber & Logs | Ash | Cu.Ft. | | | | 25,179 | 640 | | | | | |
| | Birch & Maple | " | 2,300 | 8,247 | 395,923 | 42,104 | | | | | | |
| | Black Walnut | " | | 900 | | | | | | | | |
| | Butternut | " | 126 | 1,525 | 10,000 | | | | | | | |
| | Elm | " | 126,692 | 601,247 | 394,303 | 286,204 | 33,142 | | | | | |
| | Hickory | " | | 2,350 | | | | | | | | |
| | Oak | " | 1,954 | 8,002 | 4,917 | 480 | | | | | | |
| | Hemlock | " | | | | | | | | | | |
| | Pine | " | 110,819 | 54,901 | 111,700 | 6,271 | 5,458 | | | | | |
| | Spruce | " | | | | | | | | | | |
| | Tamarack | " | 9,303 | 160,301 | 20,490 | | | | | | | |
| | Others | " | 198,779 | 1,326,792 | 148,177 | 45,233 | 40,572 | | | | | |
| Lumber | Pine | M Bd.Ft. | 1,391 | 11,004 | 19,519 | 376 | 258 | 9,482 | 2,722 | | 3,543 | 2,821 |
| | Others | M Bd.Ft. | 7,158 | 40,126 | 58,876 | 28,105 | 20,975 | | | | | |
| Other Products | | Value $ | | | | | 241 | 4,462 | 6,240 | 92,271 | 4,095 | 32,540 |

FOREST PRODUCTS
ESTIMATED FROM CENSUS OF CANADA FIGURES
SIMCOE COUNTY

| Products | Species | Unit | 1870 | 1880 | 1890 | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pulpwood | | Cords | | | 942 | 2,982 | 131 | 1,204 | 1,981 | 222 | 173 | 555 |
| Tanbark | | " | 547 | 5,477 | 43,232 | 5,637 | 282 | | | | | |
| Lathwood | | " | 1,477 | 500 | 20,676 | | | | | | | |
| Masts & Spars | | Number | 14 | 124 | 158 | | | | | | | |
| Staves | | M | 1,537 | 733 | 592 | $4,971 | $2,727 | | | | | |
| Fence Rails | | " | | | | | | 1,735 | 8,995 | | | |
| Fence Posts | | " | | | 328,264 | 51,061 | 30,599 | 18,687 | 23,775 | | 44,749 | 43,784 |
| Poles | | " | | | 36,801 | 1,328 | 3,028 | 492 | 942 | | 1,352 | 1,609 |
| Railway Ties | | " | | | 165,076 | 5,179 | 2,431 | 6,671 | 1,215 | | | |
| Fuel Wood | | Cords | 198,074 | 248,437 | 305,644 | 160,010 | 82,825 | 88,109 | 73,190 | 64,351 | 22,056 | 15,716 |
| Square Timber & Logs | Ash | Cu.Ft. | | | | 5,720 | 2,360 | | | | | |
| | Birch & Maple | " | 7,000 | 8,340 | 11,260 | 6,972 | 8,920 | | | | | |
| | Black Walnut | " | | | 200 | | | | | | | |
| | Butternut | " | 158 | 61,579 | | | | | | | | |
| | Elm | " | 54,989 | 47,070 | 15,487 | 70,202 | 21,488 | | | | | |
| | Hickory | " | | | | | | | | | | |
| | Oak | " | 133,866 | 300,139 | 1,610 | 350 | 1,000 | | | | | |
| | Hemlock | " | | | | | | | | | | |
| | Pine | " | 1,701,498 | 604,815 | 38,667 | 15,909 | 6,518 | | | | | |
| | Spruce | " | | | | | | | | | | |
| | Tamarack | " | 4,818 | 89,375 | 14,192 | | | | | | | |
| | Others | " | 236,622 | 1,623,241 | 146,681 | 15,723 | 23,330 | | | | | |
| Lumber | Pine | M Bd. Ft. | 69,107 | 25,291 | 1,957,101 | 2,591 | 1,186 | 4,394 | 1,193 | | 1,861 | 1,395 |
| | Others | M Bd. Ft. | 5,670 | 42,107 | 155,642 | 20,225 | 9,420 | | | | | |
| Other Products | | Value $ | | | | | | 1,175 | 4,201 | 35,214 | 6,671 | 60,473 |

It should be noted at this point that those parts of the watershed now in Grey County and in Dufferin County (excepting Amaranth and Melancthon Townships) were part of Simcoe County during its early history.

A prosperous sawmill industry developed along with continuing settlement and clearing of the land. The peak year of lumber production was 1861 in Simcoe County when 208,000,000 feet board measure were cut.

Few of the region's sawmills were built before 1852. The construction of the Northern Railway from Toronto to Allandale gave impetus to sawmilling, starting in 1853.

Between the late 1860's and the 1870's was the era of the county's "railway age". Other railroads and branch lines were built through Cookstown and Thornton to Barrie, through Alliston, Lisle, Glencairn, Creemore and Collingwood, and from Colwell Junction (between Barrie and Angus) through Minesing, Hendrie, Phelpston, Elmvale and Wyevale to Penetanguishene. These lines later were absorbed in the Northern, then into the Grand Trunk, and finally into the Canadian National Railways system.

The railroads helped the development of new sawmills, especially in the southern parts of the watershed, and provided a market for fuelwood. However, woods labour was scarce, so that over a period of years the price of fuelwood rose from $1.78 per cord in 1858 to $2.75 per cord in 1896. The number of sawmills rose from 37 in 1853 to 137 in 1878. Many villages were founded in conjunction with these mills. E. C. Drury discusses this development by stating:

> "The Village of Angus sprang up, and for more than 10 years enjoyed a spectacular boom - the shipping point for the lumber cut from the adjacent pines, now Camp Borden, and for farm products from further south than Alliston, and the centre of thriving local industries. There were sawmills, a flourmill, wheelwright shop, blacksmith shops, hotels, boarding houses, stores, two barber shops, even a millinery shop. However, the pine plains were cut off and the railway came to Alliston. Angus withered away."*

Although it is apparent that the exploitation of white pine was heavy in the watershed, it is also evident that hemlock was a species of major importance as a constituent of the normal mixed hardwood forest which covered particularly the vast highland sections of the watershed. We can divide the watershed into two parts when considering the amount of hemlock that was in the forest. With the exception of an area of white pine in the valley of the Pine River in Mulmur Township, hemlock was the predominant conifer in the mixed hardwood forest

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* E. C. Drury, "The Story of Simcoe County". The Tourist and Industrial Committee, The County Council of Simcoe. Third printing.

on the western half of the watershed. The eastern half, particularly that part east of the Nottawasaga River proper, contained in comparison a combined inclusion of hemlock and white pine as part of the same mixed hardwood forest.

Census evidence indicates that the critical exploitation period of hemlock was between the 1870's and the decade before 1910. It is also known that tanneries had existed in such places as Barrie almost since their first settlement. During the first three decades of this period hemlock was exploited mainly in the form of tanbark. The production of this commodity in Simcoe County alone was comparable to the total for all of the other counties in Southern Ontario in which tanbark was a major forest product during the same period. These were the Counties of Bruce, Grey, Huron, Lennox and Addington, Ontario, Perth, Wellington and York. The total production of tanbark in these counties in the census years of 1880, 1890 and 1900 was 58,674 cords. In comparison Simcoe County alone yielded 54,346 cords of tanbark during these same years.

Although the market for tanbark remained, local inhabitants came to feel that the work involved in peeling the logs was too much for the income derived from the product. Generally speaking, therefore, we find that by the turn of the century hemlock was taken to sawmills as whole logs and converted into lumber, which was considered most desirable for the construction of farm buildings. During this period hemlock lumber production in Simcoe County was 34 per cent of the total production of the eight other counties mentioned before.*

The exploitation of the watershed's forest by lumbermen was severe and wanton, though it was necessary to provide a land clearing incentive. E. C. Drury again discusses their lack of discretion in the following statement:

> "The evil thing was the destruction of productivity over the great areas of sandy land, too poor for successful agriculture, but which had produced, and could again produce, great crops of timber."

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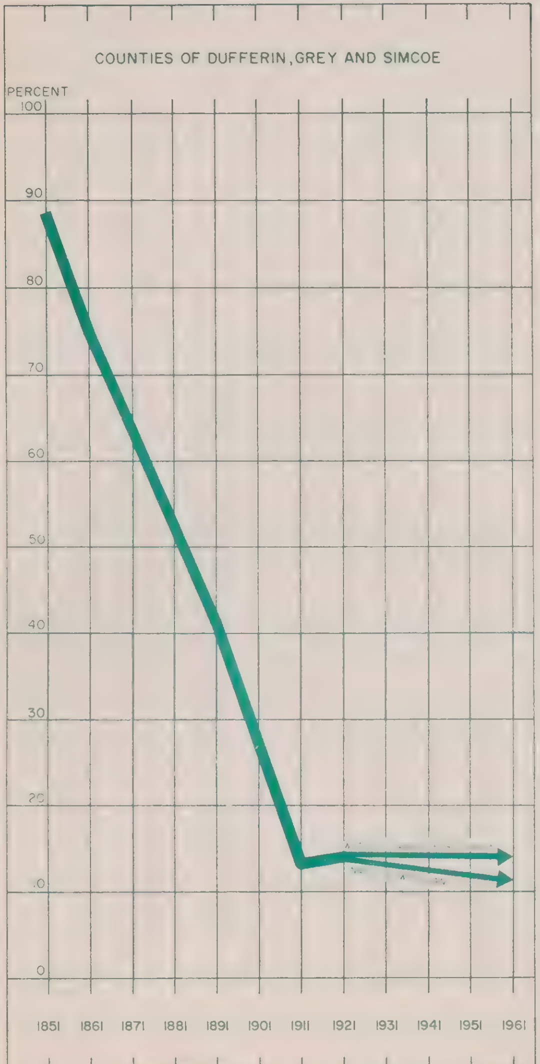
* E. C. Drury (personal communication).

# PER CENT WOODLAND




# FUELWOOD PRODUCTION


# MAPLE PRODUCTS

(EXPRESSED AS GALLONS OF SYRUP)


NOTTAWASAGA VALLEY

CONSERVATION AUTHORITIES BRANCH, Dep't E a R M, W J C 1964

## CHAPTER 2

## THE SURVEY OF PRESENT WOODLANDS

### 1. Introduction

The Nottawasaga Valley Conservation Authority lies within the Huron-Ontario section of the Great Lakes-St. Lawrence Forest Region.* It contains parts of the Barrie, Uxbridge and Peterborough site districts of the Lakes Simcoe-Rideau site region.† In addition it contains a small portion of the Meaford site district.

Within the climatic region, local variations occur, because of the local influence of slope, aspect, elevation, proximity to bodies of water and other related features.**

The prevailing association of forest trees in this region, if undisturbed, is beech, hard maple and hemlock under normal climate and soil conditions. Associated species are normally basswood, white elm, yellow birch, some red maple, and red, white and bur oak, and occasionally white pine. Disturbances such as fire or cutting may induce temporary replacement of this forest with poplar and white birch, but generally the original association is described as a climax type for the area. On local or specialized sites such as river bottoms and swamps, there occur other aggregations of trees which bear no relation to the typical climax forest of the area, such as in the Minesing Swamp. Such distinctive local combinations of tree species are in response to local climatic, soil, topographic and drainage features.

### 2. Physiographic Features

A general knowledge of the physiographic features of the Nottawasaga River Watershed is useful in the study of the particular forest conservation problems of the watershed. These are covered in detail in the Land Use section of this report. Because of the early reforestation in the area, particularly in county forests, it has received considerable study concerning the relation of physiography, forests and other features.

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* W.E.D. Halliday. "A Forest Classification for Canada", Canada Department of Resources and Development, Forest Research Division, Bulletin No. 89.

† G.A. Hills. "A Ready Reference to the Description of the Land of Ontario and Its Productivity", Division of Research, Ontario Department of Lands and Forests.

** J.R.M. Williams, B.Sc.F.. "Notes on Forest Sites in the Simcoe County Forests," February 1963 - Department of Lands and Forests, mimeographed report.

There are 21 distinct physiographic features in the watershed including the most conspicuous in Southern Ontario, namely the Niagara Escarpment, which appears as a broken but distinct boundary between the western and central sections of the watershed. In addition there are 5 till or terminal moraines, 2 till plains, 3 kame moraines, 4 clay or till plains, 2 shorelines of post-glacial lakes, 4 sand plains and several peat and muck deposits.

3. Survey Methods

For the detailed forest survey of the Nottawasaga Valley Conservation Authority, aerial photographs, each covering about 1,000 acres, were provided for the forestry party. Mapping in the field was done directly on those photographs.

Each area of woodland, scrubland, swamp and rough land was visited and described as to acreage, cover type, presence of grazing, reproduction, and average diameter at breast height. Each woodlot was classified as hardwood, coniferous or mixed. The term "hardwood" is used to denote all broad-leaved trees regardless of their physical hardness. A woodlot in which 80 per cent or more of the trees are hardwoods is called a hardwood stand; one in which 80 per cent or more of the trees are conifers is called a coniferous stand, and all other stands are classed as mixedwood.

Plantations were likewise examined and records made of method of planting, approximate age, care, damage, and survival.

Land suitable for reforestation was mapped and descriptions prepared in some detail for the larger areas.

4. Forest Cover Types

The term "forest cover type" refers to those combinations of tree species now occupying the ground, with no implication as to whether these types are temporary or permanent. A slightly modified form of the system drawn up by the Society of American Foresters has been used on this survey so that the system will adequately describe the cover types common to the watershed. The gaps in the numerical system are due to certain cover types found in the eastern United States which do not enter Canada.

The following cover types were encountered on the Nottawasaga River Watershed:

Silver maple — white elm is the major timber producing species in the Minesing Swamp, but poor management has helped to produce multiple stems after cutting.

Aspen has now become a major and often unnecessary forest tree species on the watershed.

Scrub areas should be made more productive by reforesting them.

| Type Number | Name |
|---|---|
| 1 | Jack pine |
| 2 | Scotch pine |
| 3 | Red pine |
| 4 | Aspen |
| 4a | Poplar - oak |
| 5 | Pin cherry |
| 6 | Paper birch |
| 8 | White pine - red oak - white ash |
| 9 | White pine |
| 10 | White pine - hemlock |
| 11 | Hemlock |
| 12 | Sugar maple - beech - yellow birch |
| 13 | Sugar maple - basswood |
| 14 | Sugar maple |
| 14a | Black cherry |
| 15 | Yellow birch |
| 21 | White spruce - balsam fir - paper birch |
| 22 | Balsam fir |
| 23 | Black spruce |
| 24 | White cedar |
| 25 | Tamarack |
| 26 | Black ash - white elm - red maple |
| 45 | Bur oak |
| 47 | Black locust |
| 51 | Red oak - basswood - white ash |
| 52 | Red oak |
| 57 | Beech - sugar maple |
| 58 | Beech |
| 59 | Ash - hickory |
| 60 | Silver maple - white elm |
| 60a | White elm |
| 88 | Willow |

It is interesting to note that nearly all of the cover types common to Ontario were found excepting those characteristic of the Carolinian Zone, whose ranges are confined to the extreme southern part of Ontario, and those species combinations containing red spruce that are found mainly in Eastern Ontario.

Although 32 cover types were identified in the watershed, 83 per cent of the woodland is contained in 5 cover types. In order of the area which they occupy, these types are as follows:

Type 4 - Aspen, which occupies 28.3 per cent of the woodland acreage or 44,167 acres. Aspen is a pioneer type coming in after clear-cut operations, over-grazing or fire. It frequently is the invasion species on abandoned fields and pastures. Though it avoids the wettest swamps it does grow on soils that are wet throughout a good part of the year and occurs as well on droughty soils.

Its associates may be large-toothed aspen, red cherry, white elm, paper birch and balsam poplar, the latter sometimes forming pure stands on moist sites. An understory of dogwood or of spruce and balsam fir on the wet sites, or of tolerant hardwoods on

the drier sites, is frequently present.

Although the poplar stands frequently included species that were of greater economic value, it is evident that there is more poplar than is economically desirable growing on this watershed, particularly as it was a more or less infrequently observed species at the time of original survey in the early 1800's.

The largest areas of poplar in 1962 were on the sand plain areas of Flos, Essa, Nottawasaga, Sunnidale, Vespra and Tosorontio Townships, plus the western source water townships of Osprey and Melancthon. Large acreages were also found on the sandy hills of Mono and Mulmur Townships. Future control of the area of poplar cover is necessary. As there is insufficient demand for this species and a shortage of other more valuable species, an increase in poplar acreage could be detrimental to the local forest economy. Present woodlots of poplar that cannot be cut and that have an insufficiently well-stocked secondary constituent of more useful tree species can be used as nurse crops for better species such as white spruce and white pine. These can be planted under the older canopy to the benefit of the stand. In the case of white pine, this method of stand improvement and replenishment will discourage white pine weevil activity without inhibiting normal height growth of white pine, as long as a level of 55 per cent of normal light intensity can be maintained in the stand.

The removal of up to 60 per cent of the overstory to favour white spruce is also a proven method of stand improvement.*

Type 14 - Sugar maple, which occupies 20.3 per cent of the woodland area. Along with the closely related Type 57 (beech - sugar maple) it is the cover type that is most related to the original forest on the watershed, particularly on the upland areas. Where it was situated on fertile land with good moisture conditions, much of it was cleared to make way for agriculture. This is particularly the case on the better soils of

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* 1. K.T. Logan, Forest Research Division, Tech. Notes No. 82, 1952, Department of Northern Affairs and National Resources.

2. G.A. Stencker, Forest Research Division, Canada Department of Forestry, Publication No. 1005, 1963: "Results of a 1936 release cutting to favour white spruce in a fifty-year-old white spruce-aspen stand in Manitoba".

White elm woodlots are still healthy and fairly plentiful on the watershed, but they need better management for continued timber production.

White cedar is presently an important species of the watershed's natural woodlots on wet sites.

Young sugar maple in stands such as this on a former demonstration woodlot, still represents a potential income producer for local farmers.

West Gwillimbury, Tecumseth, Innisfil, parts of Essa and all of Vespra Township. At present the principal maple cover is in the highlands of the western region of the watershed in Mulmur, Mono, Collingwood and the escarpment sections of Nottawasaga and Osprey Townships. It is also interesting to note that although a substantial acreage of maple exists on the lowland township areas in Essa, Flos, Sunnidale, Tosorontio and Adjala Townships, considerable areas have been replaced by poplar since settlement took place.

Type 60a - White elm, which occupies 14.7 per cent of the woodland area. With the closely related Type 60 (silver maple - white elm, 4.6 per cent of the wooded area) this type occurs in stream bottoms and on swampy depressions where the land is too wet for agricultural purposes unless completely under-drained. It sometimes spreads out onto slightly drier sites on adjacent pastures. Because of its occurrence on moist sites difficult to operate, there are left-over stands which, in the future, may attain a greater economic importance because of their size and quality. As well as occurring in head-water swamps such as in Osprey, Melancthon and Innisfil Townships, this type is frequently found bordering main drainage channels. Typical examples of this are found along the old glacial outlet areas of Adjala Township and the Minesing Swamp area of Sunnidale and Vespra Townships, particularly along Willow Creek and the main Nottawasaga River. It occurs as well on the Simcoe lowland areas of Flos Township.

Type 24 - White cedar, which occupies 13.8 per cent of the woodland acreage. This type occurs mostly on the muck soils of swamps where it has such associates as black ash, white elm, tamarack, red maple, yellow birch, hemlock, white pine and white birch. Where lime is plentiful, white cedar may extend over to the droughty upland slopes, where it tends to form pure stands.

This species is of importance to the farmers in the watershed since each woodlot of cedar represents a source of income in the form of posts.

Type 57 - Beech - sugar maple, which occupies 6.2 per cent of the existing woodland. This type is similar to Type 14 and generally occupies the same site. It also has been depleted in area by the extensive

development of the best land for agriculture. Its common associates are hemlock, white elm, basswood, white ash, red maple and black cherry. A common subordinate species found in this type is hornbeam.

Four other cover types occupy areas of from 1 to 2 per cent of the woodland area. These are:

Type 51 - White spruce - balsam fir - paper birch, which occupies 2 per cent of the woodland area. It occurs mainly on moist soils and frequently contains some mixtures of aspen and less commonly white pine, white cedar, sugar maple and yellow birch.

Type 5 - Pin cherry, which is a pioneer type occurring on clear-cut or burned areas as well as old marginal pastures. It occupies 1.95 per cent of the watershed's woodland area. It can be succeeded by the aspens, paper birch, or by white pine. On the Nottawasaga it could be considered a useful site for pine culture.

Type 4a - Poplar-oak, which occupies 1.89 per cent of the watershed's woodland acreage. Its normal composition consists of large-toothed and trembling aspen, white and red oak, and sometimes an inclusion of bur oak. Its associate species, red maple, hard maple and white pine, indicate that the site can be used for the culture of more valuable species, particularly white pine, as it occurs on dry ridges of shallow soil. Sumac is often part of this cover.

Type 52 - Red oak, which occupies 1.16 per cent of the woodland area of the watershed. This is a type in which the red oak is either a pure stand or the predominating stand. It may be associated with white oak on ridges on the Nottawasaga.

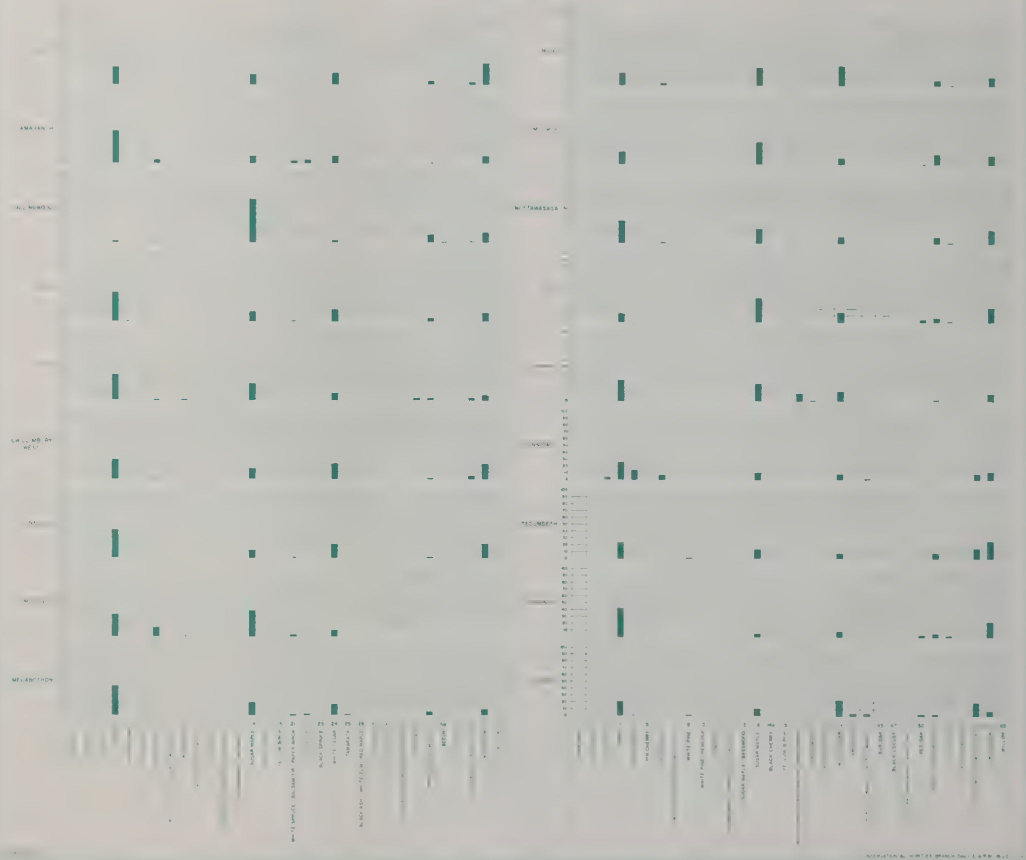
Red oak appears to grow well on the sandy ridges of the watershed, notably on the dunes near Wasaga Beach and in the Dufferin County forest region of Mulmur Township, and to produce good quality timber. This type was found in the Townships of Flos, Mulmur, Oro, Sunnidale, Tosorontio and Vespra.

The other forest cover included in the list as occurring on the watershed can be considered as trace types, since each occupies an area of less

## FOREST COVER TYPES BY TOWNSHIPS

PERCENTAGE BY TOWNSHIP

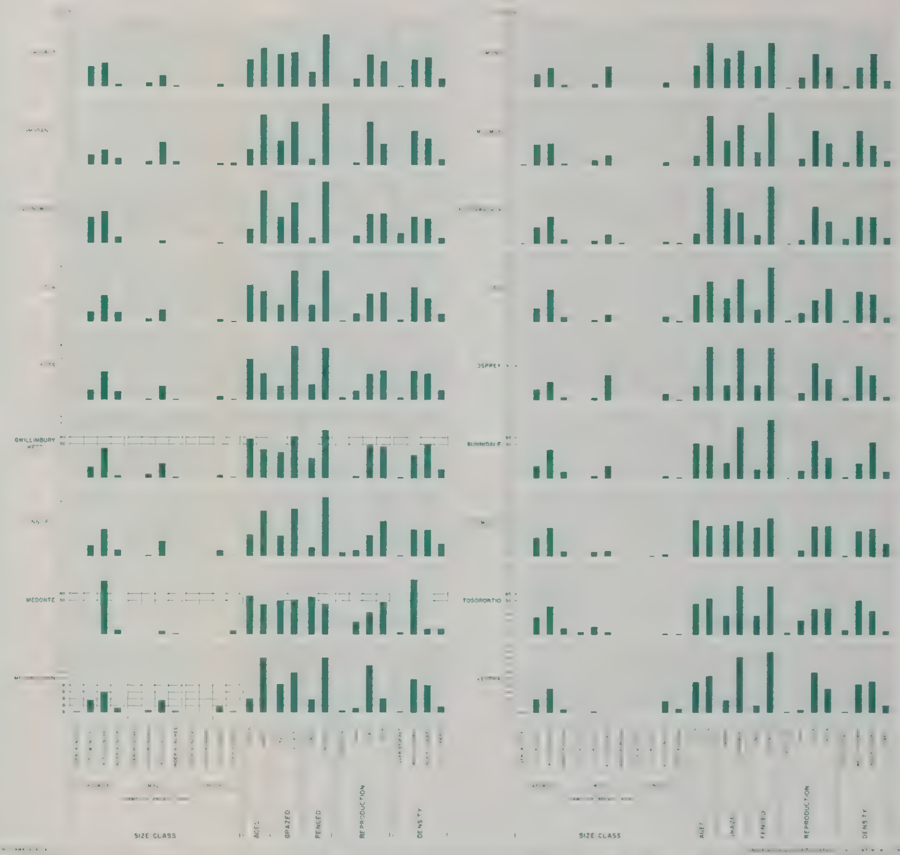
1962



# WOODLAND CONDITIONS BY TOWNSHIPS

PERCENTAGE BY TOWNSHIP

1962



than 1 per cent of the woodland acreage, ranging from 0.77 per cent for tamarack to 0.02 per cent for Jack pine, the latter being natural regeneration of this species from neighbouring plantations. Most of the tamarack is to be found in the Minesing Swamp where the stands are made up of densely stocked patches of small trees, forming more of a wildlife cover than potential timber.

It is also notable that white pine, in a pure stand form, now occupies only 0.64 per cent of the woodland area of the watershed.

## 5. Condition of Woodlands

Woodland within the Nottawasaga River Watershed represents an area of 155,985 acres or about 20 per cent of the total watershed area. This is natural woodland and does not include 13,310 acres of private plantation, 11,650 acres of planted forests belonging to the three counties in the watershed, and 250 acres of township forests. Hardwood occupies 66.6 per cent of the woodland acreage, while 24.0 per cent is mixedwood and 9.4 per cent is coniferous.

Very little of the watershed's woodland, whether hardwood, mixedwood or coniferous, is in stands averaging over 18 inches in diameter at breast height, the sizes merchantable as saw log material.

Coniferous stands between 10 and 18 inches, the size desired for posts and poles, make up only 0.35 per cent. This is exclusive of any plantation areas where some of this type of material now exists. In comparison, 21.42 per cent of the watershed's hardwood and 4.03 of its mixedwood is in this class. This represents the potential supply of merchantable timber for the near future from natural stands.

This size class would also represent a potential pulpwood supply, particularly in some areas of poplar cover. This material would be suited to a pulp and paper industry utilizing a semi-chemical process.

Just over 62 per cent of the watershed's woodland is classed as 4 to 10 inches in size (diameter at breast height), with most of the material in this class being hardwood. Another 10.94 per cent is under 4 inches in size. These statistics are further evidence that most of the watershed's remaining potential merchantable woodland is hardwood. The mixed and coniferous woodland over 4 inches d.b.h. (25.1 per cent) should soon reach a merchantable stage, thereby paying for proper management in a relatively short time.

The remaining natural forest cover will take considerable time to grow to merchantable size. Thinning will only increase the rate of growth through the release of 4.4 per cent of the woodland, that which is overstocked.

The desired degree of stocking is present in 43 per cent of the stands examined. The remaining 52.6 per cent, that is either slightly or severely under-stocked, should be managed to promote better regeneration. Underplanting and inter-planting to supplement natural regeneration should be used where feasible.

Regeneration generally is either inadequate (50.5 per cent) or poor (36.7 per cent). This is only partially explained by the continued existence of grazed woodlots, a condition which occurs in 34.4 per cent of the watershed's woodland. It should be remembered that these figures are based on the entire woodland area of the watershed, which includes the Minesing Swamp, source areas and the other large swamps or muck lands in the watershed where grazing is not a factor. If these wet forest sites were not included, the percentage of regeneration reduction due to cattle grazing would be more obvious. Only 20.6 per cent of the woodlots are fenced against cattle.

All of these facts help to accentuate the problem of woodlot grazing on the drier areas on which the forest regeneration is tolerant and attractive to cattle. The Authority should therefore be sharply aware of this problem and make an effort to curb this practice through public education.

6. Scrublands

In all, 20,616 acres of the watershed are covered with tree species which will never attain commercial size. The most common species are scrub willow and dogwood on poorly drained sites and hawthorn and sumac on dry sites. Much of this area is located on abandoned farmland or neglected pasture.

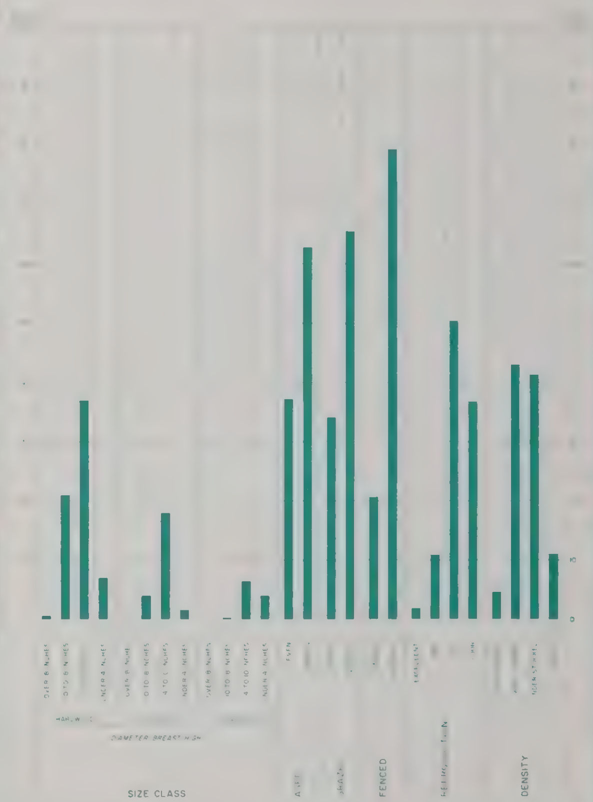
In some cases this land can be restored to agricultural use through drainage or through eradication of dry scrub. However, where such restoration does not seem economically feasible the area should be returned to tree cover through the systematic replacement of the scrub species with more valuable species.

The area of dry scrubland is a major problem only in the escarpment or high slope regions of Collingwood and Nottawasaga Townships, where hawthorn and scrub apple trees have been allowed to invade a total of 4,227 acres. This represents a fairly large acreage requiring rehabilitation, as it is most common on

## FOREST COVER TYPES TOTAL WATERSHED


NOTTAWASAGA VALLEY

## WOODLAND CONDITIONS TOTAL WATERSHED




CONSERVATION AUTHORITIES BRANCH

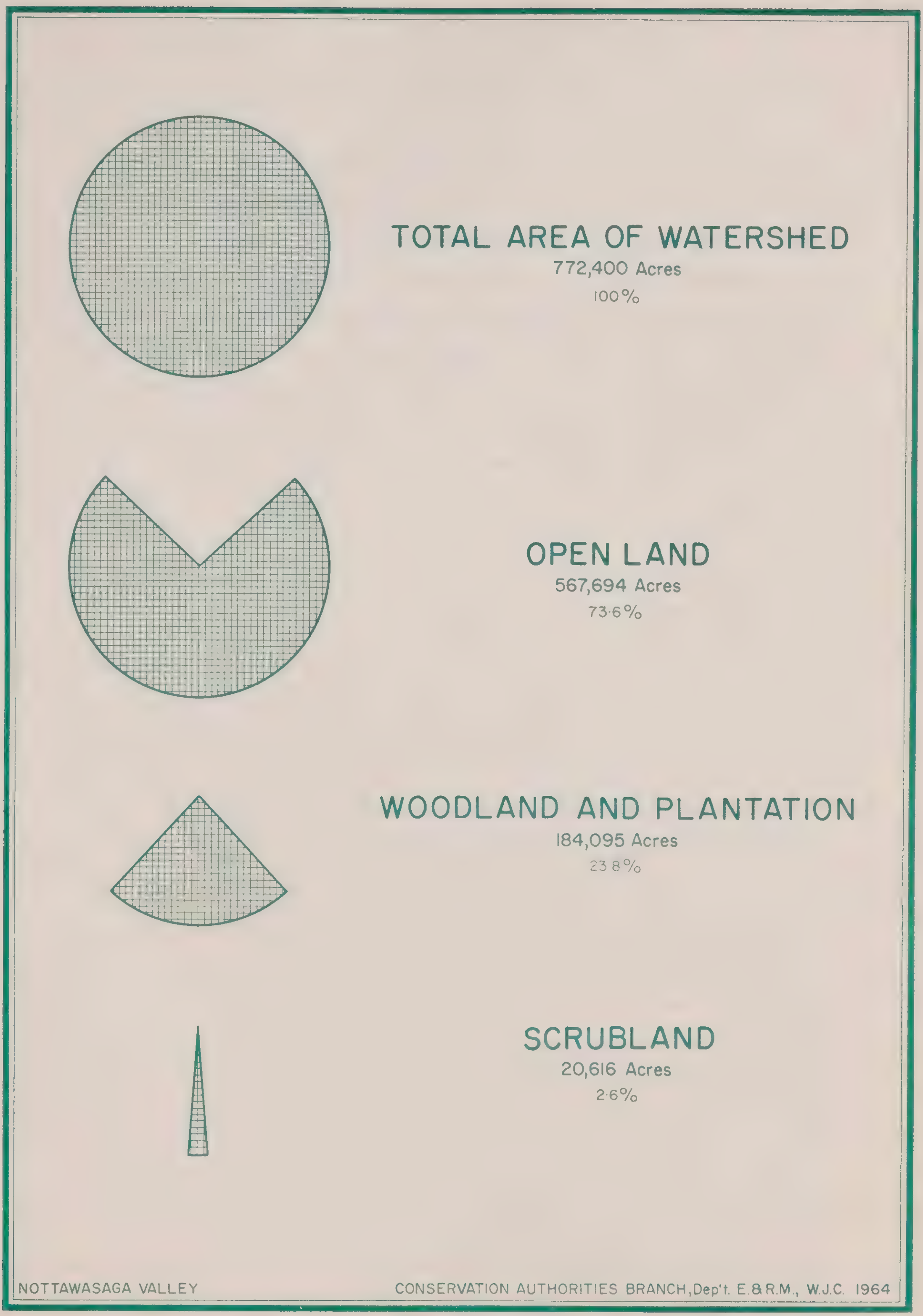
O.R.M., W.J.C. 1964

clay soils where weeds and compaction during the period of cultivation have increased the hazard of establishing forest plantations.

On the watershed there is a considerably greater area of wet scrub than dry scrub. The townships having the greatest individual acreage of this type of cover are in source water areas such as Amaranth, Melancthon, Osprey and Oro Townships, and parts of the Simcoe lowlands in Innisfil, Mono, Nottawasaga, Sunnidale, Tosorontio and Vespra townships, an area totalling 8,829 acres. With the exception of its connection with the larger wooded swamps where it provides some limited wildlife benefit, wet scrub represents undesirable cover on individual farm properties. Methods of rehabilitating these areas include reclamation for agriculture, reforestation to such species as white spruce, or using them as a suitable site for farm ponds.

The general distribution of scrublands in acres throughout the watershed is shown in the following table:

| Township | Dry Scrub | Wet Scrub | Total |
|---|---|---|---|
| Adjala | 147 | 636 | 783 |
| Amaranth | 10 | 446 | 456 |
| Collingwood | 1,221 | 53 | 1,274 |
| Essa | 277 | 617 | 894 |
| Flos | 185 | 771 | 956 |
| West Gwillimbury | 23 | 197 | 220 |
| Innisfil | 143 | 726 | 869 |
| Medonte | 75 | 16 | 91 |
| Melancthon | 58 | 951 | 1,009 |
| Mono | 291 | 941 | 1,232 |
| Mulmur | 482 | 376 | 858 |
| Nottawasaga | 3,006 | 1,499 | 4,505 |
| Oro | 438 | 802 | 1,240 |
| Osprey | 381 | 742 | 1,123 |
| Sunnidale | 284 | 1,169 | 1,453 |
| Tecumseth | 200 | 418 | 618 |
| Tosorontio | 32 | 553 | 585 |
| Vespra | 533 | 1,917 | 2,450 |
| Total | 7,786 | 12,830 | 20,616 |




LAND CLASSIFICATION
TOTAL WATERSHED

# CHAPTER 3

## THE MINESING SWAMP

This is an area of special interest to the Authority since, despite changes made in its character since the settlement of the surrounding land, the swamp represents an area where multiple resource management can still be practised. It is useful at present for natural flood water storage during the period of spring run-off, for forest management and for certain limited forms of agriculture around its immediate fringes and along the Nottawasaga River's banks. In addition it serves as a haven for migrating waterfowl when flooded in the spring, as a breeding area for limited numbers of waterfowl when this flood subsides and as a suitable habitat for upland game animals, particularly on its fringes. Beaver and muskrat can also be trapped along the streams flowing through the swamp and it has some use for public fishing.

### 1. General Description

The Minesing Swamp is part of the Minesing flats which represent an annex of the Nipissing Lake plain, shut in by the Edenvale moraine. This includes a section of open bog in its south-eastern region, several hundred acres in extent. It is one of the boggy regions in the Nottawasaga River system where the river has not yet established complete drainage of its basin. As a result, the river has built natural levees along its banks so that its tributary, the Mad River, is forced to follow a parallel course for several miles before finding an entry. Willow Creek behaves in a similar fashion crossing the central portion of the swamp.*

What is now commonly called the Minesing Swamp contains an area of over 13,000 acres including a cleared acreage along the Nottawasaga River that reaches virtually into its centre. Normally, at least 9,000 to 10,000 acres of this area is flooded for up to a month each spring, when the Nottawasaga River, the Mad River and Willow Creek overflow their banks. Similar flooding conditions can be found, during the same season, downstream at Jack Lake, an area several miles northwest of Minesing Swamp.

Conditions of soil saturation and submergence of ground vegetation can be found in parts of the swamp even during the growing season, notably in the vicinity of Coates Creek and the eastern part of the Willow Creek flood plain. In

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* Putnam and Chapman, "The Physiography of Southern Ontario".

the latter area this has helped to kill many of the large elms.

The flooding of areas around streams running through the swamp may begin in the late fall. Areas generally covered with two to three inches of water plus the same depth of ice were found during reconnaissance trips in late December of 1962 by survey crews of the Conservation Authorities Branch. This was possibly due to the above-normal precipitation during the autumn of that year.

The Minesing Swamp was traversed by members of the survey crew several times in each season of the year in order to observe features of the swamp under varying seasonal conditions. However, further study of a more detailed nature, directed toward a variety of conservation problems, would have to be carried out before the complete picture of this region's function in the watershed could be fully appreciated.

2. Forests

There are 11,360 acres of various forms of forest cover in the Minesing Swamp. Over 75 per cent of this is hardwood. There are only 600 acres of mixedwood, principally on the edge of the swamp, where spruce and fir have regenerated in and under poplar, eventually changing a limited area of the fringes of the swamp to this type of forest. A small area of this type of mixedwood can also be found at the north end of the open bog region.

All but 200 acres of the softwood in the swamp is in Vespra Township. The vast majority (70 per cent) of this is cedar of a size that is merchantable as post material. Inclusions of tamarack and black spruce also occur, generally of the same size as the cedar. This coniferous area is more or less confined to the southern, eastern and western edges of the open bog area. On traversing this region a gradation of forest cover is apparent from cedar, to cedar - tamarack with some white pine, to a pure tamarack cover which decreases in size as the open bog is approached. The soil in this area is peat or muck. On the inner fringe of this coniferous region lies a considerable acreage of very small tamarack with an admixture of cedar of the same size. This stand is stocked thickly enough to impede human passage. Frequent use of this cover by game animals is indicated by the many game trails present. During the winter these trails form a well-trodden network. Towards the centre of the open bog the characteristic cover changes to a series of cedar islands, each with a tamarack fringe, interspersed with long lanes of such vegetation species as Labrador Tea, Pitcher Plant, Reed Grass and their common associates. A certain amount of cedar regeneration is spreading into these open areas. In the region of Willow Creek

the vegetation changes to a combination of very clumpy sedges, dogwood and scrub willow. Towards the east, as the open bog gradually gives way to an area of mixed forest of increasing density, dogwood replaces the clumped sedges as the chief cover.

This whole section of the south-eastern portion of the swamp is therefore a bog containing a series of changes in vegetation, and appears to be the section most favoured by game animals.

Another swamp meadow of scrub willow and grass exists north of Willow Creek, around a spring drainage passage that flows into a drainage ditch leading into the main Nottawasaga River.

The hardwood forest in the Minesing Swamp favours two forest cover types, elm and elm - silver maple. Over 80 per cent of this is elm - silver maple. The general forest area exhibits varying degrees of density but is largely adequately stocked. It is mainly an uneven-aged forest that is generally not regenerating well except in places by coppice growth.

One other forest type of interest is that of black ash - white elm - red maple, which can be found particularly in sections subject to frequent if not continued soil saturation, mainly in the Coates' Creek area and in that part of the Willow Creek flood plain east of the point at which this stream makes a right-angle turn and flows approximately parallel to the Nottawasaga River. These are young stands that will require time to grow into merchantable stock.

The best timber is situated mainly in the vicinity of the three larger streams where they flow parallel to each other, and farther north along the main Nottawasaga River.

Although there are stands where the trees are over 18 inches in diameter at breast height, many of these, particularly the silver maple, show various stem malformations. Windfall conditions are also common, especially on or near streambanks.

On the level sections of the Nottawasaga River around its junction with Willow Creek, hackberry, a rare tree species more common to the Lake Erie region, is an associate of the older stand of silver maple - elm. Specimens of varying ages from sapling stage to near maturity, with individuals ranging from 14 to 22 inches D.B.H., can be found in this same forest stand. This species can be observed along the river banks north and outside of the Minesing Swamp to a point just west of the bridge crossing the Nottawasaga River at Lot 22 of Concession IV of Flos Township. One specimen of hackberry measuring 32 inches D.B.H. was observed on the east river bank on the south half of Lot 21, Concession III of the same township.

The growth rate of trees in the best timbered region of the Minesing swamp appears to be good. Examination of stumps in 1962 in an autumn cut-over near the cleared area in the centre of the swamp indicated growth rates of up to 14 inches in 50 to 60 years. Both elm and silver maple regeneration was good in this cut-over but undoubtedly most of the elm seedlings were destined to die in spring floods due to lengthy periods of submergence which this species cannot tolerate.

Regeneration generally is sub-normal in the hardwood forest. This condition is aggravated by the general allowance of free range to cattle in the swamp. Since these animals are unlikely to venture into areas where the ground is too soft due to water saturation, only the drier and best timbered areas are affected. The future of regeneration of the more valuable hardwoods is limited, therefore, by the flood-water killing of elm seedlings and the grazing of the more succulent silver maple. Better range management could be obtained if these cattle were fenced from the forested areas and confined to cleared sections which are devoted to the development of improved pasture.

Logging operations even in the drier sections are difficult to complete, since skidding and hauling work is often hampered by wet conditions. This may serve as a natural curtailment of over-cutting, with its resultant slash disposal problem. The one hardwood cutting operation in process in 1962 indicated that little attempt at slash disposal was being made.

Finally, large areas of willow scrub are common, since the generally moist to wet conditions in the swamp promote the growth of this type of cover, particularly after cutting. There is a particularly large area of wet scrub in the centre of the north-eastern section. In some places this cover is almost thick enough to prevent human passage. It is unlikely that this area can be presently rehabilitated to a more useful forest cover.

### 3. Conclusions

It appears, therefore, that Authority interest towards forestry in the Minesing Swamp should be integrated with that of the management of other resources, such as the preservation of natural flood water impoundment areas and fish and game management. Log jams are occurring along the banks of the Nottawasaga River where frequent undercutting of large trees by the river is causing them to fall into the main stream. When entertaining any bank stabilization schemes the Authority should consider removing such large trees before severe undercutting occurs.

A view of the typical cover in the open section of the Minesing Swamp. Common species are Reed grass, Labrador tea, and white cedar.

A typical source area near the west boundary of the watershed.

On the site of the Beeton Reservoir, forest cover is reducing sedimentation in stream channels.

| Township | Location | Treatment |
|---|---|---|
| Mono | W. half of Lot 18, Con. VII | A 22-year-old red pine plantation, having been pruned and thinned once |
| Vespra | W. half of Lot 21, Con. XI | A 20-year-old Jack pine stand that has had a pruning operation |
| | W. half of Lot 12, Con. V | A 36-year-old red pine and white pine plantation that has received one pruning |
| Flos | Lot 46, Con. II | A red pine, Scotch pine, Jack pine and white spruce mixture that has had a pruning and thinning |
| Essa | W. half of Lot 10, Con. I | A thinning carried out on a 25-year-old white spruce plantation |
| Tosorontio | E. half of Lot 18, Con. III | A mixture of 25-year-old red pine, white pine and Jack pine which has been pruned and thinned |
| Mulmur | W. half of Lot 21, Con. VIII | A 28-year-old mixture of Scotch pine, red pine and white pine which has been thinned |

2. Demonstration Woodlots

An early effort to promote good woodlot management was made by the Department of Lands and Forests when it established a number of demonstration woodlots. These were areas of private woodland on which owners agreed to follow prescribed methods of woodlot management and to permit access to the area by interested persons. Unfortunately many of these demonstration woodlots were cut over when the property changed hands or fell into neglect, so that the program has lagged.

On the Nottawasaga Watershed, examples of former demonstration woodlots can be found. One such property is on the north half of Lot 23, Concession IX, in the Township of Tecumseth. This woodlot is a sugar maple bush which has been thinned to remove the defective trees and which has a good layer of maple regeneration due to protection from grazing.

Another example of a demonstration woodlot can be found on the south half of Lot 4, Concession XII, in the Township of Innisfil, where a sugar maple - beech stand has been thinned by removing the wolf trees and the mature trees. It still receives some care.

A further example of a former demonstration woodlot can be found on the east half of Lot 20, Concession VI, in the Township of Essa. In this case, the woodlot consists of a mixture of 34-year-old red pine, Scotch pine and Jack pine. However, this former demonstration woodlot has been neglected and should be improved by a thinning and pruning operation.

3. <u>Tree Cutting By-Laws</u>

Under The Trees Conservation Act of 1946 and its successor The Trees Act (R.S.O. 1960, C. 406), 23 counties have passed by-laws to restrict and regulate the cutting of trees. These by-laws do not interfere with the right of the owner to cut material for his own domestic use, but specify certain diameters below which trees may not be cut for sale. On the Nottawasaga Watershed, the Counties of Dufferin and Grey have tree cutting by-laws. The County of Simcoe has no such law.

Such diameter limits are only an elementary step to prevent indiscriminate slashing of woodlots, but when these by-laws have been enforced rigidly they have proved to be of considerable benefit. There will, however, usually be fast-growing trees above the diameter limit which are increasing rapidly in value and should be left for future cutting.

Better than a rigid diameter limit is the marking of trees for cutting according to their condition. Professional advice on such marking is available through the Zone Forester at Angus, for the Counties of Simcoe and Dufferin, and at Owen Sound, for the County of Grey. There are also private professional foresters who can give such advice. It is recommended that the Authority promote the adoption of a tree cutting by-law for Simcoe County.

4. <u>County Forests</u>

Many counties have established forests under agreement with the Ontario Government. Enabling legislation for the establishment of County Forests was passed as early as 1911, but was not put into effect until the establishment of the Hendrie Forest in Simcoe County in 1922. The work is done at present under The Trees Act of 1950 and The Forestry Act of 1952. These Acts provide for the purchase of lands and for their management under agreement between the county and the Ontario Department of Lands and Forests.

Within the Nottawasaga Watershed, the County Forest system of the three counties occupies 11,650 acres, with 8,770 acres belonging to Simcoe County, 1,800 acres to Dufferin County and 1,080 acres to Grey. Properties belonging to

these County Forests are often mixtures of natural woodland and plantations.

Hendrie Forest was established when Simcoe County purchased 1,000 acres of waste land in Vespra Township in 1922. This acreage has grown into an area of 3,317 acres, largely of planted coniferous forest. Some stands of red and white pine in this and other nearby tracts have already produced a harvest from thinnings and have grown remarkably high volumes of wood per acre. Examples of this growth are:

(a) A red pine plantation planted in 1924:

  (i) At age 28, total volume growth of 3,760 cubic feet per acre = 44.2 cords per acre.

  (ii) At age 38, total volume growth of 6,517 cubic feet per acre = 76.7 cords per acre.

  (iii) The mean annual increment between the ages of 28 and 38 years was 275.7 cubic feet per acre = 3.25 cords per acre.

(b) A white pine plantation planted in 1925: Present volume per acre 3,290 cubic feet = 38.7 cords per acre. This is after recovery from weevilling and a light thinning.

(c) Red pine poles have been cut in Hendrie Forest having a length of 42 feet and a top diameter of 6-7 inches.

(d) It is also noteworthy that at Orr Lake, another Simcoe County forest unit just outside the watershed, a 34-year-old white pine and red pine plantation yielded 1,700 cords of wood from a 100-acre tract from a thinning consisting of the removal of every third row.

5. Municipal Forests

Several municipalities other than counties have established forests, which are eligible for assistance from the Department of Lands and Forests. These are useful for screening residential areas from industries, for water supply protection and for revenue production. The municipal forest protecting the reservoir near the Village of Beeton, and owned by that municipality, is an example of such a forest. It occupies an area of over 100 acres and is covered with some natural hardwood and mixedwood forest and four 39-year-old coniferous plantations. This forested area protects a small watershed that provides water for the village's reservoir system. This reservoir has been in operation for over 40 years.

There are about 260 acres of township-owned forests in the watershed. These are in Mono, Mulmur and Oro Townships.

The Mono Township forest consists of several plantations, between 20 and 36 years of age, covering a total of about 55 acres in which the species planted were white pine, red pine, Scotch pine and Jack pine. Thinnings were carried out some years ago to make pulpwood.

A similar plantation owned by Mulmur Township is situated near the main block of Dufferin County Forest on the boundary between Dufferin and Simcoe Counties. This area also contains 30-year-old plantations.

Oro Township Forest occupies the east half of Lot 36, Concession I, south-east of the Village of Craighurst, and consists of 100 acres, mainly covered with coniferous plantations adjoining a small area of natural hardwood woodlot.

6. Midhurst Forest Station

Midhurst Forest Station was established in Simcoe County in 1922. At present it occupies 2,800 acres of land including 350 acres of nursery beds and a park operated by the Parks Branch of the Department of Lands and Forests. It is the source of forest nursery stock supplying the needs of county and municipal reforestation programs and of private landowners who are carrying out their own reforestation plans.

The nursery station is located on a former bare pasture area that once supported an excellent stand of white pine which was logged in 1875. Between this period and 1922 the area suffered several forest fires, until the reforestation, which now forms part of the present nursery area, was begun.

7. The Angus Seed Plant

This is a forest seed extraction plant that was first established near the village of Angus in 1923. Its function is the collection of seed from the immediate area of Angus, the receiving of seed from collection stations elsewhere in the Province, seed extraction and cleaning, storage, shipping, and the testing of seed for its likely percentage of germination. Seed from this plant is distributed to the whole Province.

About 44 species of seed are treated at the Angus station. The pines and spruces are the main species collected. Small quantities of hardwood and ornamental plant seeds are also extracted and stored here for use in highway plantings and specialized plantings by other governmental agencies.

Part of the program dealing with the establishment of seed orchards is located at this station. This is a process whereby scions from specially selected seed trees all over the Province are grafted on to seedling stock grown in nursery beds at this station.

8. Tree Farms

Over the past few years a movement has been under way to recognize well managed forest properties as Certified Tree Farms. Under the sponsorship of several organizations interested in better forestry, the Canadian Forestry Association in 1953 formed a National Tree Farm Committee to recognize, with a suitable sign and certificate, those owners who agree to maintain their land for the growing of forest crops. They must also protect the land adequately, agree that cutting practices will be satisfactory to ensure future forest crops, and permit inspection by Committee foresters.

There are seven tree farms on the Nottawasaga Watershed, listed as follows:

| Township | Location |
|---|---|
| Mulmur | W. half of Lots 23 and 24, Concession V |
| Mono | E. half of Lot 15, Concession IV |
| | W. half of Lot 15, Concession VI |
| | N.W. quarter of Lot 18, Concession VIII |
| | S. half of Lot 12, Concession IIE |
| | E. half of Lot 5, Concession IIIE |
| Innisfil | N. half of Lot 4, Concession XII |
| | S. half of Lots 4 and 5, Concession XIII |

The Authority should promote the creation of more Tree Farms such as these to encourage interest in better woodland management.

9. 4-H Clubs

These clubs are organized by the Ontario Department of Agriculture assisted by the Department of Lands and Forests and must be sponsored by an organization interested in the improvement of woodland and reforestation. Members must be between 12 and 21 years of age and each member undertakes a project such as marking a half-acre plot of woodland for thinning or reforesting a quarter-acre of land. For this purpose the Department of Agriculture furnishes $3.00 per member and the sponsoring organization $1.50. Winners may enter the Provincial Inter-Forestry-Club Competition.

At present there are three clubs operating within or on the boundary of the watershed. One is located in Barrie at the North Collegiate High School, one is at the high school in Elmvale and the third club is located in Alliston at the

Banting Memorial High School. Plantations set out by the last club are in Mulmur Township north of the Township Forest.

Sponsorship of such clubs would be a worthwhile project for the Authority.

10. <u>School Forests</u>

There is a school forest in the watershed, a small 25-year-old Scotch pine plantation strategically placed on the western edge of the public school property in the Village of Nottawa, Nottawasaga Township. This plantation was given to the school in the will of a former employee of the Department of Lands and Forests, who stipulated that it be managed properly. It provides a useful shelterbelt for both the school and its playground and thinnings have been used to build seats for the school's baseball diamond.

The Authority has in this school forest an excellent example of the functional use of a small area of reforestation, and the object lesson of this reforestation is serving several generations of local children.

It would be a worthwhile project for the Authority to use this example as a means of promoting further plantations of this sort on the properties of schools, particularly rural schools which could use this form of windbreak or shelterbelt.

## CHAPTER 5

## FOREST CONSERVATION MEASURES REQUIRED

It is apparent from the data obtained during survey that a considerable acreage in need of reforestation remains in the Nottawasaga River Watershed, particularly in the highland areas where erosion control is most necessary. Despite the work done by private individuals and the excellent efforts of the counties within the watershed, ample room remains for Authority efforts in this field.

In addition it is obvious that much of the natural hardwood acreage of the watershed needs management by agencies that will prevent wasteful exploitation and allow the forest to produce higher quality material as lumber or veneer.

Swamp forest areas still exist on the watershed in regions of natural headwater storage and in other locations where the multiple land use principle can be applied. These properties also should be purchased and given better management.

### 1. Authority Forest

In view of the conditions described, a proposed Authority Forest has been mapped showing those areas most in need of public acquisition for forest management. If in certain instances it should prove advisable for some other public body, such as one of the counties, to acquire a particular tract which fits in with its present holdings, the Authority should co-operate rather than compete. For the sake of completeness, however, this report includes all such areas without differentiation.

Twenty-one Conservation Authorities have now entered into agreements with the Ontario Government for the establishment and management of Authority Forests. Provincial grants cover half the cost of the land and in some cases, where it is necessary or desirable to include merchantable timber, the Province also assumes the cost of the timber. These contracts run for an agreed period, during which time the Ontario Government agrees to establish the forest and pay the cost of such items as fencing, buildings, equipment, labour, maintenance, trees - in short, everything connected with the management of the forest.

At the end of the agreement period, the Authority may exercise any one of three options: first, to take the forest over from the Government and pay back the cost of establishment and maintenance without interest; second, to relinquish all claim to the forest, whereupon the Government will pay to the Authority the

original purchase price; third, the agreement may be renewed for an additional period during which the Authority and the Province will share equally in costs and profits.

It should be noted that in the Nottawasaga Valley Conservation Authority, the proposed Authority Forest has been designed to perform the following functions:

(a) To adjoin and supplement existing County Forests and extensive private reforestation.

(b) To preserve source water areas.

(c) To return certain highland areas to forest where the potential erosion hazard is high.

(d) To return presently useless scrubland to productive cover.

(e) To reforest lands that are considered to have a low capability in the production of agricultural crops.

(f) To keep in a forested state those areas of muckland on which the peat is less than four feet in depth.

An effort has also been made to restrict the recommended Authority Forest to areas that do not interfere with existing tobacco rights, with potential community pasture acreage or with land that is more useful for recreation areas.

These recommended areas are listed according to the townships in which they are located:

(a) Collingwood Township

The recommended Authority Forest in this township covers the top of the escarpment and the steep slopes of the stream valleys running off these highlands. Authority Forest properties in this area should be used for the management of existing hard maple woodlots, the return of dry scrublands to productive cover and the reforestation of cleared sections for run-off and erosion control. Some experimental work will be needed to determine the best methods of tree seedling establishment and weed control on the heavier soils that are present.

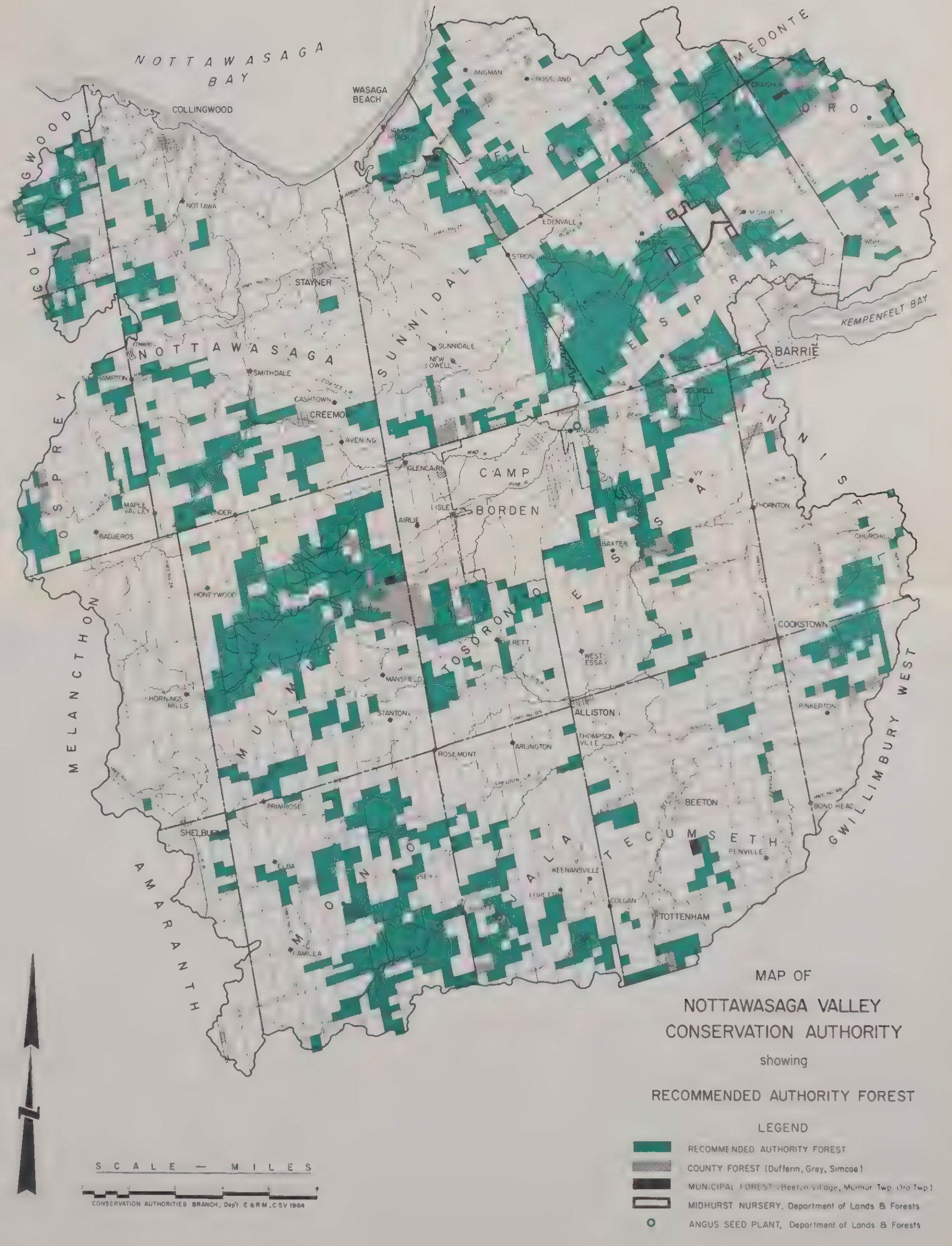
(b) Osprey Township

The recommended Authority Forest in this township is found in four areas:

(i) The highlands of the Pretty River headwaters in the Rob Roy area, consisting of a large acreage of natural hardwood along with some rough hills that should be reforested.

(ii) An area of natural forest and open poorly drained Class VI land west of Singhampton, including a headwaters creek section of the Mad River.

(iii) An area at the east end of Concession I and Concession II, NDR, consisting of natural swamp forest and Class VI land. The drainage area of a small headwaters creek of the Mad River has also been


MAP OF
NOTTAWASAGA VALLEY
CONSERVATION AUTHORITY
showing
RECOMMENDED AUTHORITY FOREST
LEGEND
RECOMMENDED AUTHORITY FOREST
COUNTY FOREST (Dufferin, Grey, Simcoe)
MUNICIPAL FOREST (Beeton Village, Mulmur Twp, Oro Twp)
MIDHURST NURSERY, Department of Lands & Forests
ANGUS SEED PLANT, Department of Lands & Forests
SCALE — MILES
CONSERVATION AUTHORITIES BRANCH, Dep't E & R M, CSV 1964
NOTTAWASAGA BAY
KEMPENFELT BAY
COLLINGWOOD
NOTTAWASAGA
SUNNIDALE
VESPRA
ORO
MEDONTE
FLOS
OSPREY
MELANCTHON
AMARANTH
MULMUR
TOSORONTIO
ESSA
INNISFIL
WEST GWILLIMBURY
TECUMSETH
ADJALA
MONO
CAMP BORDEN
COLLINGWOOD
WASAGA BEACH
STAYNER
NOTTAWA
ANGMAN
BARRIE
EDENVALE
SUNNIDALE
NEW LOWELL
SMITHDALE
CASHTOWN
CREEMORE
AVENING
GLENCAIRN
LISLE
AIRLIE
ANGUS
COLWELL
MIDHURST
MINESING
CRAIGHURST
THORNTON
BAXTER
CHURCHILL
COOKSTOWN
PINKERTON
WEST ESSA
ALLISTON
THOMPSONVILLE
ARLINGTON
ROSEMONT
MANSFIELD
STANTON
HONEYWOOD
HORNINGS MILLS
MAPLE VALLEY
BADJEROS
PRIMROSE
SHELBURNE
BEETON
BOND HEAD
PENVILLE
KEENANSVILLE
LORETTO
COLGAN
TOTTENHAM
ELBA
AMILLA

included in this section.

(iv) The main source of the Mad River west of Badjeros, consisting mostly of natural swamp forest. There are some open fields requiring reforestation adjoining a Grey County Forest block at the north end of this area.

(c) Melancthon Township

Only one small area of recommended Authority Forest was chosen here, a mainly open and poorly drained section west of Shelburne at the source of a small headwater stream of the Boyne River.

(d) Mulmur Township

This area of recommended Authority Forest includes the entire valley of the Pine River from Dufferin County Forest to Honeywood and the valleys of its northern tributaries in Mulmur Township. A series of recommended properties are also situated on mainly open and steeply rolling Class VI land containing some natural woodlots, west of the Villages of Stanton and Mansfield and north of Primrose, all in the middle reaches of the Boyne River. One area of 200 acres has been recommended in the north-west corner of the township.

(e) Amaranth Township

Recommended Authority Forest blocks in this region lie along the boundary between Amaranth and Mono Townships. These properties consist of idle fields on Class VI and VII land, some of them reverting naturally to forest cover. They form part of the upper source waters of a small tributary of the upper reaches of the Nottawasaga River and a tributary of the Boyne River west of Primrose.

(f) Mono Township

A large area in Mono Township has been recommended for Authority Forest. The various sections involved are listed as follows:

(i) Almost the entire valley system of Sheldon Creek. Much of the immediate vicinity of the stream is in natural forest, but large areas of the surrounding highlands consist of rolling Class VI lands that should be reforested. The upper headwater sections east of Primrose, north of Mono Centre and near Relessey have been included.

(ii) The valley of the Upper Nottawasaga River and the surrounding highlands now known as the Hockley Valley. An effort should be made by the Authority in this section to co-ordinate its forestry operations with the development work being done by the owners of resort properties in this area.

(iii) The extreme western headwaters of Bailey Creek form a series of mainly forested properties west and south of the Village of Elba. Erosion control and the return of Class VI land to profitable timber production are features of the forestry recommendations for this township.

(g) Nottawasaga Township

The recommended Authority Forest area in this township is categorized as follows:

(i) Scattered properties on the bouldery beaches at the base of the "Blue Mountains" west of Collingwood.

(ii) Scattered properties on more level lands west and south-east of Nottawa Village, including areas of poor forest, on what has been classified as Class VI and VII land.

(iii) The escarpment highlands west of Duntroon.

(iv) Class VI lands mainly under scrub cover in the region of Devil's Glen and Glen Huron.

(v) A small area of poorly drained Class VI land south of Stayner, covered with poor forest and scrub.

(vi) The highlands of the Noisy and Mad Rivers in the area of Smithdale, south of Singhampton, west of Creemore, and in the Dunedin-Maple Valley area. In most cases this is steeply sloped Class VI land that is unsuitable for efficient agriculture.

(vii) An area of Class VI land on the highlands west of Avening.

(h) Sunnidale Township

With the exception of the Wasaga Beach area, which is described separately, the northern section of the recommended Authority Forest in Sunnidale is between Highway No. 26 and the Nottawasaga River, just south of Jacks Lake.

The southern areas recommended are west of the New Lowell-Brentwood region, and include sandy lands requiring reforestation and natural woodlots needing management that adjoin some established County Forest blocks. Also included are properties on Class V land on either side of the Mad River just before it enters the Minesing Swamp.

(i) Flos Township

Two areas recommended are in the upper reaches of Black Creek and Willow Creek's north tributary. The other Authority Forest blocks concern a large area of Class VI land west of the Village of Phelpston, the valley of the main Nottawasaga River and its vicinity east of New Flos, and the drainage area of Marl Creek.

(j) Wasaga Dunes

The Wasaga dune section in Sunnidale and Flos Townships is a sandy, hummocky area that is covered mainly with natural forest and a small acreage of plantations, and lies east of the urban part of Wasaga Beach. This is an area that should remain under cover because of the erosion hazard. The present forest

conditions indicate that it can produce good timber, particularly red oak and red pine. Up to 3,027 acres could be incorporated into an Authority Forest block without undue interference with the development of the urban area to the west.

(k) Vespra Township

In many cases the recommended Authority Forest in this township consists of existing woodlands that need management or that should be gradually changed in composition to produce better quality timber. The open fields throughout these forest blocks should be reforested for erosion control or for the return of low-class agricultural lands to productive forest cover. The areas chosen were:

(i) The lowland forest areas on the flatlands west of Barrie .

(ii) The south highlands overlooking Midhurst Nursery and the Minesing swamp, where erosion control by keeping the hills in cover is necessary.

(iii) The middle reaches of Willow Creek east of the Minesing Swamp.

(iv) The upper valley and valley slopes of Willow Creek between Little Lake and Midhurst Nursery.

(v) A strip of Class VI land west of Hendrie Forest.

(vi) The entire valley and upper slopes of the north tributary of Willow Creek to Craighurst.

(l) Minesing Swamp

As previously stated, the Minesing Swamp is a region where multiple resource management principles should be employed. The area most suitable for forest production consists of over 8,500 acres along Coates Creek, the Mad River, the Nottawasaga River, the north-eastern fringes of the swamp and the southern hillsides from Concession X of Vespra Township to Highway No. 90. The latter region contains a few fields where reforestation should be considered for the control of gully erosion as well as for timber production.

In addition there is a central section of the swamp of over 4,300 acres which is also recommended for purchase for Authority Forest. This area consists of wet scrub, marsh and poor swamp forest, which is primarily of value for flood water storage and as a wildlife habitat. It should therefore be included in the area purchased, to keep it in its natural state. The suggested areas are shown on the accompanying map.

(m) Oro and Medonte Townships

The rolling moraine uplands of Willow Creek and its tributary east of Edgar and Craighurst have been recommended as Authority Forest. This area

contains some existing County Forest blocks.

In addition the lowland forest areas of the upper reaches of South Willow Creek, in the region where it begins to form a network of small streams north of Crown Hill, should be managed as a forest area and should be supplemented with reforestation on cleared fields around it. The upper flood plain of Willow Creek south-east of Crown Hill should also be kept under forest cover.

(n) Tosorontio Township

Recommended Authority Forest areas in this township are similar to those described for the next township. More naturally forested areas have been included, however. The properties chosen are along the Boyne River and in the Pine River region west of Everett.

(o) Essa Township

With the exception of certain scattered properties along the main Nottawasaga River in the south end of the township, it is the flat sandy areas of the Simcoe lowlands that are the best location for an Authority Forest in this township. This region offers the Authority one of its best opportunities for the growing of pine. Areas of existing forest have also been included in the recommendation, notably in the headwaters region of Bear Creek north and west of Baxter. The remaining recommended Authority Forest acreage is on tributary streams between Thornton and Baxter, next to existing County Forests, along the main Nottawasaga River and along the lower reaches of Bear Creek.

(p) Innisfil Township

Innisfil's Authority Forest recommendations include the muckland area of Innisfil Creek east of Highway No. 400. It should be remembered that some of this area is suitable for clearing for market gardening. Already some property has been cleared for the selling of peat and a small acreage has been producing vegetables for some time. The natural forces of economics will therefore control Authority Forest action in this area.

In addition, properties adjoining the Village of Churchill should be reforested for erosion prevention, and a completely forested property on Innisfil Creek at the junction of its northern tributaries should be purchased for management of the woodlot on it.

One large area of existing forest and rolling land requiring reforestation lies in the township's north-west corner. This area adjoins some

Properties like this one in Adjala Township where erosion is present should be incorporated into the Authority Forest.

Although less common now, blow sand areas are still a problem on the watershed.

Reforestation is a productive treatment for blow sand areas.

Simcoe County Forest blocks south and west of the Village of Holly, and is part of the headwaters of Bear Creek.

(q) Adjala Township

The recommended Authority Forest areas in this township are mainly in the high moraine areas extending east from Mono Township. These properties are located in the upper reaches of Sheldon Creek, the Nottawasaga River north-east and east of Hockley Village, and the upper reaches of Bailey Creek south-west of Loretto and Colton. Erosion control and a return of Class VI lands to the production of timber are reasons for recommending that these sections of Adjala be returned to forest cover.

In addition, two areas of rough Class VI land that are susceptible to erosion have been recommended for Authority Forest on Sheldon Creek on the boundary between Adjala and Tecumseth Townships.

(r) Tecumseth Township

The existence of some Class VI land is the main reason for recommending that parts of this township become an Authority Forest. These areas surround a Simcoe County Forest block south of Tottenham and 200 acres immediately west of this same village. Additional blocks are recommended in the headwaters of the south-east tributary of Beeton Creek and in the highland region near the Beeton Reservoir forest property. Similar recommendations are made for a few scattered properties along Penville Creek north-west of Bondhead.

Properties on the fringes of the mucklands bordering Bailey Creek west of Beeton should receive management in the existing wooded sections and some reforestation treatment. A similar situation exists along Innisfil Creek in Concession XII, west of Highway No. 27, where the stream overflows its banks every spring. Reforestation work in this area will have to consider species such as silver maple that will tolerate submergence by water for prolonged periods.

The last recommended Authority Forest block in this township is a series of properties on the south side of Highway No. 89 east of Nicolston Dam. Eroded slopes should be reforested here and management practices should be applied to a large acreage of existing scrubland and sub-standard woodlots.

(s) West Gwillimbury

The recommendations for an Authority Forest in this township are confined to two areas - that known as "The Hollows", where some Simcoe County Forest

is already present, and the flat, poorly drained plains north and west of "The Hollows". The latter area already contains a considerable acreage of forest and wet scrub.

2. Private Reforestation

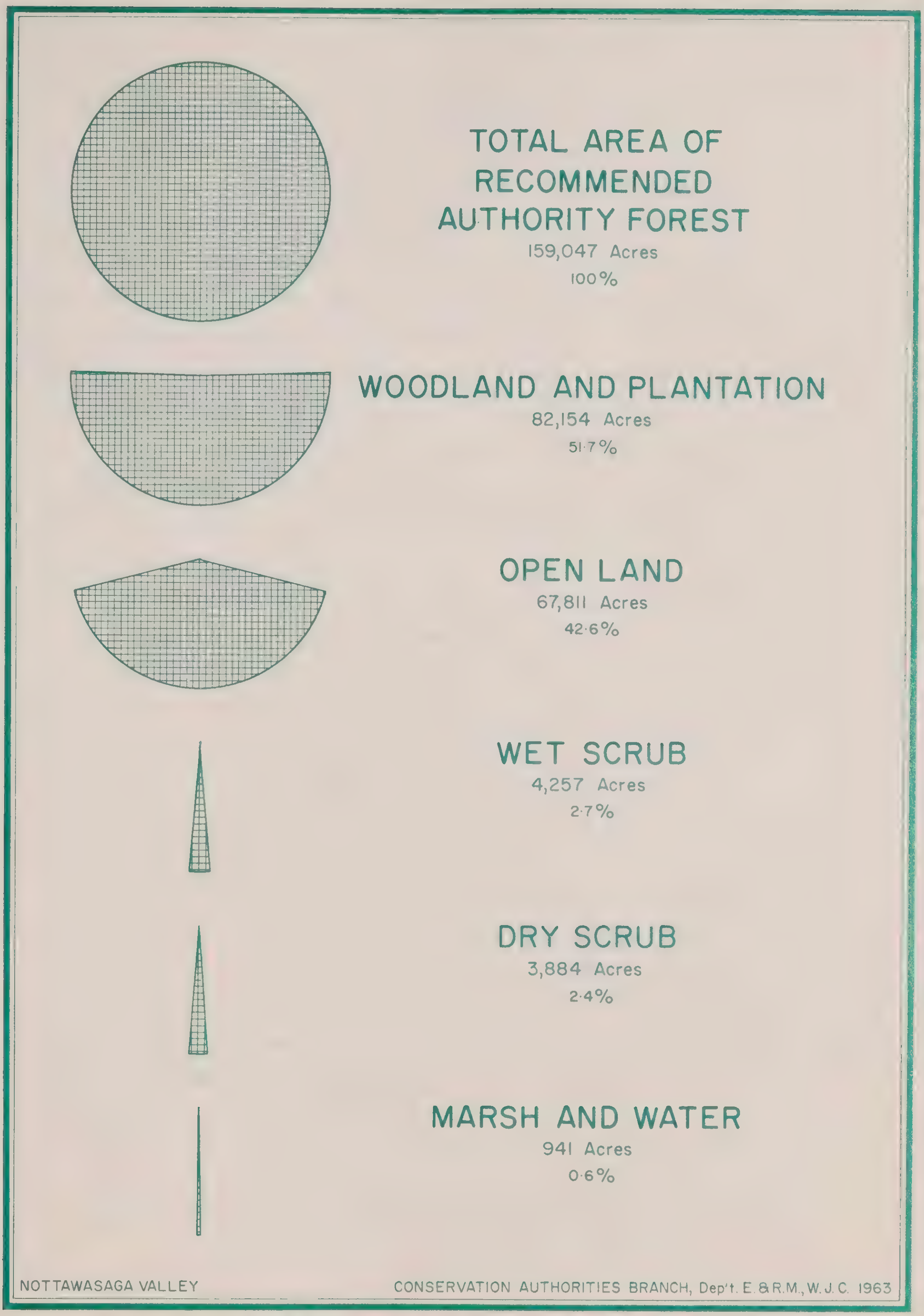
On many farms, even in the better farming areas, there are small tracts which, because of steep slopes, stoniness or poor drainage, would be better in tree cover. These tracts are not suitable for public acquisition and management, but the effect of reforestation on control of run-off, improved summer stream flow and stabilization of wood-using industry justifies public assistance in such work. These areas have not been privately reforested heretofore because the owner has some other minor use for the area, because he is discouraged by the long period between planting and harvest of a forest crop, or more commonly simply because of inertia on his part.

The interest of private owners in reforestation may be fostered in several ways. Public education, such as that now carried out by the Zone Forester in the district, can be furthered by the Authority. In addition, direct assistance to private planting can be given.

Several other Conservation Authorities have purchased tree-planters which supply a planting service to private owners at a nominal cost. Where rough ground makes hand planting necessary, some Authorities refund $10 per acre if inspection shows that planting has been done carefully and the plantation is adequately protected from livestock. When labour conditions permit, the Authority might itself organize crews for hand planting on these sites.

It is the policy of the Department of Lands and Forests to charge $14 per thousand for Scotch pine and $10 per thousand for other planting stock. For some years trees were distributed free. Following the end of the war in 1945, the nurseries were unable to meet the greatly increased demand, and it was felt that a charge for trees would ensure more care in ordering the required amount and in planting the trees received.

Because property lines often run at an angle to the topography, there are many small areas requiring reforestation which are unsuited to acquisition for public forest. These smaller areas have been recorded on the survey photographs which will be available to Department staff assisting the Authority. Such information should be useful to the Authority in indicating to individual property owners where revisions in their land use program should be made.




LAND CLASSIFICATION
RECOMMENDED AUTHORITY FOREST

There are two common conditions where this sort of practice could be put to good use on the Nottawasaga River Watershed as part of a total watershed program. One is the steep "pitch" or hill which is too dangerous to cultivate with machinery and has been abandoned to the forces of erosion or the invasion of scrub. The other is the small stream valley that runs through a series of farms, creating a narrow irregular strip of more or less vacant land. On each farm this condition represents a small acreage, but the total effect on the stream can be important.

Streambanks requiring improvement in flat areas can be found in the north half of Tecumseth Township where the lower reaches of Bailey Creek, Beeton Creek, Penville Creek and Innisfil Creek flow into the Nottawasaga River.

Examples of the steep pitch are the old beach lines in Nottawasaga Township west of Collingwood and Nottawa, and the southern face of a hillside on each side of Highway No. 400 north of the Cookstown cloverleaf in Innisfil Township. The promotion by the Authority of effort in reforestation on private property, either through a direct planting service or through a subsidy for the reforestation of these steep areas, would be a useful means of returning such areas to a productive state.

Examples of stream valleys that could be improved by the property owners in a community effort can be found in most of the regions of better class agricultural lands. Repeated examples can be found between Beeton and the Hockley Valley in Tecumseth and Adjala Townships. In some cases the valley sides are already showing open eroded faces. Other typical examples can be found between Stayner and Cashtown, particularly on the west side of the county road.

A spectacularly eroded small valley slope exists in Mulmur Township on Concession IV on the west half of Lot 28.

These are all areas where the individual should be asked to contribute to the betterment of his own land rather than have the Authority create a large forest block to solve the same problem.

RECOMMENDED AUTHORITY FOREST - ACRES

| Township | Open Land | Woodland & Plantation | Dry Scrub | Wet Scrub | Marsh & Water | Total |
|---|---|---|---|---|---|---|
| Collingwood | 1,275 | 1,975 | 861 | 12 | | 4,123 |
| Osprey | 1,173 | 3,455 | 205 | 240 | 194 | 5,267 |
| Melancthon | | 23 | | 107 | | 130 |
| Mulmur | 12,232 | 11,279 | 273 | 137 | 57 | 23,978 |
| Amaranth | 245 | 420 | | 35 | | 700 |
| Mono | 10,908 | 7,073 | 204 | 276 | 10 | 18,471 |
| Nottawasaga | 6,715 | 5,141 | 1,315 | 165 | 6 | 13,342 |
| Sunnidale | 1,746 | 2,131 | 45 | 280 | | 4,202 |
| Flos | 4,028 | 7,265 | 179 | 268 | 45 | 11,785 |
| Wasaga Dunes | 183 | 2,844 | | | | 3,027 |
| Vespra | 4,763 | 7,660 | 309 | 718 | 2 | 13,452 |
| Minesing Swamp | 971 | 10,956 | | 406 | 572 | 12,905 |
| Oro & Medonte | 2,384 | 3,185 | 234 | 330 | | 6,133 |
| Tosorontio | 2,946 | 3,426 | | 101 | | 6,473 |
| Essa | 5,473 | 6,761 | 166 | 373 | 40 | 12,813 |
| Innisfil | 845 | 2,189 | 38 | 293 | | 3,365 |
| Adjala | 6,470 | 2,847 | 22 | 154 | 6 | 9,499 |
| Tecumseth | 3,381 | 1,942 | 23 | 221 | | 5,567 |
| West Gwillimbury | 2,073 | 1,582 | 10 | 141 | 9 | 3,815 |
| Total | 67,811 | 82,154 | 3,884 | 4,257 | 941 | 159,047 |

# CHAPTER 6

## FURTHER CONSERVATION MEASURES REQUIRED

### 1. Woodland Management

The woodlot inventory shows that there are 155,985 acres of natural woodland in the Nottawasaga Valley Conservation Authority. A great deal of this area requires better management. While experimentation is desirable to determine the best method of handling certain problems, the general principles of woodlot management have been known for years but have not been applied. A free advisory service is available from the Zone Foresters, but is not sufficiently used, and a readily-understood pamphlet on "The Farm Woodlot" can be obtained from the Department of Lands and Forests.

One of the most difficult problems confronting the private owner in the management of his woodland is the utilization of the small woodland products which can be readily made and handled by the owner. These products, such as fuel-wood, pulpwood, bolts, posts and poles, if properly harvested, increase the productivity of the woodlot and the gross returns per acre. The volume of these small products thrown on the market would be reduced by diameter-limit regulations which restrict the wholesale commercial slashing of woodlots. Nevertheless, much material of this type could still be produced from thinnings and improvement cuttings and from limbs and tops of trees. The difficulty of marketing such low-grade material has seriously hampered owners in carrying out the needed improvement work in their woodlots. Any means which can be discovered for using small and poor-grade wood should be developed to the fullest extent. At the present time interest is increasing in the possibility of manufacturing wood chips in the woodlot by means of a portable chipper. These chips can be cut finely enough to manufacture chicken litter material which will compare with shavings and sawdust in its ability to absorb. In addition, local tests have been performed to show that under practical conditions chips make excellent, safe cattle bedding regardless of the species of wood used. This bedding material lasts for a long time and serves as a useful absorptive layer under normal straw bedding, thereby representing a saving in straw to the farmer. It is also useful as a fill for wet farmyards. After use it can be spread on fields to increase the humus content of the soil.

Chips can be made from any species of wood, and tops and branches can be utilized. The number of pulp companies which can use hardwoods is limited at the

present time and only those making kraft paper can use chips containing bark, but the demand for hardwood chips will increase and portable barkers have been developed. Every woodlot owner should consider the possibility of improving the quality of his woodlot by utilizing the low-grade material as chips or otherwise.

Owners of large woodlots might be encouraged to undertake thinnings and improvement cuttings if equipment or trained crews were available at reasonable cost. The Authority should consider offering such a service. As an alternative, the Authority might offer a subsidy for each acre improved to its specifications and found satisfactory on inspection by its officers.

The development of high-quality wood materials is of paramount importance to woodlot owners in the watershed. There are a number of small crating mills catering to local truck gardeners, either in the watershed or not far outside its boundaries, that use low-grade materials. However, these cannot use up the present ample supply of such low-grade material as poplar. Only a major industry such as a pulp and paper plant could adequately utilize the available acreage of cheaper wood material.

Firewood has also received a waning demand since the Second World War. Woodlot owners therefore lack encouragement to perform clean-up thinnings since the production of fuelwood offers little incentive.

However, the watershed is within reach of the furniture industry of Southern Ontario that represents 54 per cent of the total furniture production in the Province and more than 20 per cent of the total number of furniture industries in Canada.

This should induce woodlot owners to aim at the production of quality wood, particularly in the escarpment sections of the watershed where hard maple is a principal species.

2. The Forest and Livestock

The grazing of woodlots is still one of the greatest causes of woodland deterioration on the farm today. This method of livestock husbandry produces automatic and continuous loss of regeneration and eventually can leave the mineral soil of the woodlot itself completely exposed.

The lack of repaired fences or loss of proper pasture due to weather conditions is the usual reason given for using woodlots as pasture. However, it is not uncommon to find woodlots deliberately used as an integral part of a pasture rotation system, with cattle fenced into parts of them.

Properly managed woodlots should be marked before cutting to insure that younger trees will be left for future timber harvest.

Periodic thinning of plantations is necessary to promote continued maximum growth.

The timber producing potential of planted red pine on the watershed is illustrated by this 27 year old stand in Hendrie Forest.

The economic fallacy of grazing the farm woodlot has been proven in Wisconsin where over a five-year observation period in Richland County it was shown that unimproved pasture produced over 5 times as much (dry matter) feed as woodland and improved grass-legume pasture produced over 11 times as much feed. Woodland pasturage is considered by agricultural leaders to be only half as good for animal nutrition as proper pasture. This is because of the lowered food value of grasses grown in shade, plus the added smothering factor of weeds which are usually prolific in wooded pastures. Even in the open park-like stands in the Rocky Mountain regions, grazing experiments have proved that acceptable gains are made by livestock in wooded areas from spring to early summer only. After this period livestock if left on the wooded range tend to lose nearly all of this weight gain.

Field observations in Ontario indicate further that cattle prefer the economically desirable species such as maple, basswood and elm, whereas the undesirable species such as ironwood, dogwood and hawthorn are grazed only as a last resort. This preference not only changes the quantity but the quality of the reproduction and so the succeeding stand.

All reproduction is affected to some degree by the effect of grazing on forest soil. Compaction by livestock, particularly on clay soils, makes seedling survival and growth difficult. It also breaks up the protective litter layer, exposing the mineral soil to drying, thereby reducing germination. Consumption of the vegetation within reach reduces the volume of new litter available to keep the soil open and porous and in a highly absorptive state. Thus water relations are changed, adversely affecting the rate of tree growth and natural regeneration.

Cattle break down young trees to graze on them or to brush off the flies. This has a particularly damaging effect in young pine plantations. Sheep interfere with pine seedling growth by nipping the buds. Hogs can ruin either natural or planted woodland by grazing and scuffing the roots. This allows fungal infection as well.

There are, of course, secondary benefits to the livestock from access to wooded areas. These include shade, shelter from severe weather, protection from "face flies" and "shipping fever" causes, and quiet seclusion for the delivery of their young. The better condition of stock enjoying these facilities is a real economic gain to the farmer.

However, this gain can be secured by fencing off a small corner of the woodlot or by developing groves or shelterbelts of fast-growing trees. The remaining woodlot is thus left to continue production, unimpaired by grazing.

Damage done by grazing varies according to the size of the woodlot and the number of animals raised on it. However, even where damage is gradual, continued grazing virtually ruins a woodlot, since it removes the whole succeeding stand along with its progressive increase in growth. Though the harvest period of a woodlot is beyond the life span of the property owner, making it difficult for him to appreciate his loss through grazing, the loss remains, probably in the hands of the owner's heirs.

A woodland is doomed where conditions persist which will not permit natural regeneration. After a time, with no new growth to replace larger trees which die of natural causes, the canopy begins to open up. Sunlight then can dry out the soil, weeds and grasses gain a foothold and a sod begins to form. In general, tree seeds which germinate cannot compete with an established grass cover. As these conditions progress, the stand becomes open and park-like and eventually the trees disappear, leaving a rough, weedy pasture which cannot be improved without great difficulty.

Woodland grazing affects more than the growth of trees. Soil erosion in the woodland increases as the absorptive capacity and mechanical protection afforded the soil by the litter are reduced. The open canopy exposes the soil to the erosive force of rain and compacted soil forces overland movement of water. Livestock tend to follow trails in the woodland and these often become centres of serious erosion. Thus, continued grazing increases surface run-off and soil erosion.

The case against woodland grazing is summed up by the United States Department of Agriculture Yearbook on Soil for 1957:

> "Investigators also agree on the low quality of the forage usually produced under hardwoods. Forage volumes are very low, except in open stands... and even there they seldom exceed 500 pounds an acre. Cattle thus reap little benefit, except shade and exercise, from grazing a hardwood forest - and the farmer ends up with a poorer woodlot for timber production and watershed protection."

The disadvantages of woodland grazing, then, are many including increased soil erosion and water run-off, which in turn lower the yield of the land as well as adding to the flood hazard. The quantity as well as the quality of wood products reaching the market is reduced and the poor pasture results in increased

Woodlot grazing, still common on the watershed, is detrimental to forest regeneration.

This former demonstration woodlot was fenced from cattle and now has an excellent layer of hard maple regeneration.

Hackberry of this size (38" d.b.h.) is a rarity this far north in Ontario.

costs per cow. These losses affect not only the individual but also the community as a whole. The Authority is therefore justified in carrying out a vigorous campaign of education in woodland improvement and also in offering direct assistance to woodlot owners. It is recommended that the Authority, through discussions with woodlot owners, should develop a program which will help eliminate the practice of woodland grazing.

3. Forest Fire Protection

The average person does not realize the seriousness of damage caused by fire in the woodlot. Though he may know that young growth and small trees are burned by surface fires, he does not realize the extent of the less obvious damage such as the destruction of humus which itself preserves the condition and water-retaining capacity of the soil. When the humus and ground cover are destroyed the sun and dry winds remove the moisture required for tree growth and plant nutrients are destroyed. The heat of the fire also injures the growing tissue inside the bark of older trees which are not actually burned, exposing the wood to attack by insects and fungi. Even though through time the wounds may be completely healed, the damage shows up as defects when the tree is cut for lumber.

The first step in fire control is fire prevention, and the best assurance of prevention is an enlightened public opinion which will make every member of the rural community conscious of the seriousness of the fire damage and of his duty as a citizen to do all he can to prevent it. The farmer can prevent most fires in farm woodlots if he exercises the same care that he does around his home and buildings. It is particularly necessary to exercise such care in areas which have been cut recently, since the accumulation of slash creates a serious fire hazard. Close utilization of tops and the scattering of slash so that it lies close to the moist ground and rots faster will help to reduce this danger.

From the evidence collected in the northern states of the United States, where conditions most nearly approximate those of rural Southern Ontario, it is apparent that the most effective fire protective systems are those set up under the following conditions:

(a) Where the system is organized under the direction and control of the state forester and the wardens in each township are appointed by him on the recommendation of the local council.

(b) Where wardens paid an annual retainer are actual residents in the locality. Usually they are farmers who have had practical instruction in fighting

Considering the number of observations made in 1962, damage by the European Pine Shoot Moth is considerably greater in Mono Township than anywhere else in the watershed. Nine damaged plantations were found in that township as against ten damaged plantations throughout the rest of the watershed. The latter were in the Townships of Mulmur, Tosorontio, Flos, Essa, Adjala and Nottawasaga. In recent years damage by this insect has reached epidemic proportions in the Province; generally in red and Scotch pines. Investigations are under way but no simple and effective control measure has yet been discovered.

Another insect enemy of red and Scotch pines is the Root-Collar Weevil, that has recently caused serious damage in some plantations. This insect kills young trees by girdling them below the ground. Certain insecticides applied around the base of infested trees and on the stumps of cut-over Christmas tree plantations are said to give good control. Observations of this insect's work were made in Essa and Vespra Townships.

Damage by the Red-headed Pine Sawfly, particularly on red pine, was found in Osprey, Mulmur, Medonte, Innisfil, Flos and Essa Townships. This is an insect whose larvae defoliate red pine and Jack pine. Some of the infestations were in process during the survey. One near a County Forest block in Flos Township was serious.

Similar types of leaf damage to coniferous trees were found, caused by the European Pine Sawfly. Christmas tree plantations were favoured mainly. These attacks were found in Mono and Essa Townships with the greatest number of infestations being found in Mono.

Leaf-feeding insects may kill conifers by one complete defoliation and hardwoods by defoliation for three years in succession. However, even partial defoliation may so weaken trees that they will be attacked by other enemies. Protection from leaf-feeding insects is therefore desirable. This is the kind of attack in which spraying is most successful.

Since investigations of forest insects are constantly under way, the owner considering insect control should always check with the Zone Forester to find the most effective methods now in use. This is particularly important when arranging for the use of the virus control of European Pine Sawfly.

(b) Tree Diseases

The chief diseases of the hardwoods are the various trunk, butt and root rots, and chronic stem cankers, which are all endemic and may cause serious

These misshapen red pines are the result of European pine shoot moth damage.

The red-headed pine sawfly is causing damage to useful red pine plantations.

This shows red-headed pine sawfly larvae at work.

damage under aggravating conditions. Woodlots in the Nottawasaga area present very diverse conditions with respect to the incidence of these diseases, a circumstance which is usually related to their past history. Thus, many containing old timber are in need of heavy preliminary salvage and sanitation cuttings as a result of mismanagement or neglect. Such cuttings should precede or be combined with cleanings and improvement cuttings designed to improve the composition and structure of the stands. Having established a sanitary condition, normal care should maintain it and obviate loss on account of decay.

The wood rots are commonly thought of as diseases of mature and overmature timber, but experience has shown that infection may occur at a very early age. In hardwood sprouts the stem may be infected from the parent stump. In older trees infection is chiefly through wounds, either of the root or trunk, which may be caused by fire, trampling by animals, insects, meteorological agencies, or by carelessness or accident in felling and other woods operations.

For many reasons "cleanings" in the reproduction are desirable, especially where the woods have been heavily cut. Besides favouring the valuable species, those stems which are of seedling origin should be favoured over stump sprouts which are more liable to decay.

In harvest cuttings, which should recur at frequent intervals, the permissible volume allotted should include trees in which incipient decay is discovered and those which have become a poor risk through injury or other circumstances.

The White Pine Blister Rust is a serious enemy of that important tree species. It can be controlled by elimination of the currant and gooseberry bushes which spread the disease. This is economically feasible where white pine is growing on good sites, and where a considerable quantity of white pine on a small area reduces the labour involved. However, since the domestic currant and gooseberry varieties are also hosts of this disease, their elimination would require the consent of many of the garden owners in an infected area.

On the Nottawasaga Watershed White Pine Blister Rust was found in plantations in Mono, Innisfil and Vespra Townships. Since the survey was not a detailed pathological examination, it can be assumed that other areas have at least pockets of infection by White Pine Blister Rust.

At present efforts are being made to grow a hybrid white pine variety that is resistant to Blister Rust. Though there has been some initial success, it

will take a considerable period of time to produce the large numbers of resistant seedlings required for commercially sized plantations.

The Dutch Elm Disease, which causes rapid wilting and death to all native elm trees and most introduced species, has caused great concern ever since its first discovery in Canada in 1944. It appeared first in Quebec, then somewhat later at Windsor, and has subsequently spread over Southern Ontario, and is generally considered to have spread close to the limit of the range of elm in this province and in Quebec. Infected trees have been found in the area of the Nottawasaga River Watershed.

Control is achieved by elimination of diseased trees and by spraying healthy trees to prevent attack by the elm bark beetles which carry the disease. For valuable trees in parks, along streets or around houses, the cost of control is well within reason. However, in woodlots, the complete coverage of all the elm trees required to control elm bark beetles is impossible and therefore sanitation is cheaper and a much more practical answer. This sanitation method means that diseased trees should be removed promptly and that whenever elm logs are cut all of the branches, twigs, and slash generally should be cleaned up completely and burned.

Because elm is a principal hardwood species of the Authority's woodland, the Authority should alert its member municipalities to the danger and co-operate with them in making plans to control this disease. It should also be remembered that although the presence of this disease indicates a need for control, it should not provide woodlot owners with an excuse for the indiscriminate slashing of elm before the degree and extent of infection have been determined.

5. Windbreaks and Shelterbelts

In the process of clearing land for agriculture, woodlots and belts of trees along fence lines have been removed which had served as natural shelterbelts. The restoration of these in the form of windbreaks is essential to a complete conservation program in many parts of Southern Ontario.

When proper species are used and windbreaks are correctly placed, the effects are almost entirely beneficial. The effects may be direct or indirect, but in either case are the result of reduction in wind velocity. The effects of windbreaks on crops and cultivated fields may be listed as follows:

(a) Direct Effects

(1) Wind damage and lodging in small grains and corn are reduced or eliminated.

(2) Snow and the resultant moisture are more evenly distributed over fields, particularly on the higher spots where they are required most.

(3) Wind erosion of the soil is minimized.

(b) Indirect Effects

(1) Moisture loss by evaporation is reduced.

(2) Temperatures in the field are raised; this may prevent frost damage, accelerate growth and even lengthen the growing season slightly.

(3) Erosion of the soil by water may be reduced by its more even distribution when released from snow.

The benefits of windbreaks to buildings in reducing heat loss in winter have been shown to be considerable. Experiments conducted in the United States proved that more than twice as much heat is lost from a house with a wind of 20 m.p.h. as with one of 5 m.p.h., and a windbreak can easily reduce wind velocities in this proportion. Used in this way they can often be made to form an effective background for the house and protection for farm buildings. Another advantage of windbreaks is that they provide shelter and runways for insectivorous birds and other small animals.

Recent literature from the British Isles, where shelterbelts in agricultural areas are being stressed, indicates that their value has been proven as regards the health and efficiency of farm livestock. American and Russian sources estimate that a withdrawal of 5 per cent of cultivated ground for shelterbelts results in an increased output on the sheltered land of 20 per cent. British farmers are apparently willing to spend considerable sums in planting and caring for their windbreaks in order to achieve these advantages.

Belts of trees consisting of one or two rows are usually called windbreaks, and with more than two rows, shelterbelts. In Southern Ontario windbreaks as a rule give sufficient protection except where wind erosion of soil on rolling land is severe. Here shelterbelts may be required. On level land windbreaks may nearly always be established along existing fence lines, but on rolling land consideration should be given to the contour of the land. The prevailing winds in Southern Ontario are generally from the west, so that the greatest protection will be derived from windbreaks on the west side; but the placement of windbreaks on the other three sides as well should be considered.

Both the height of the trees and the wind velocity influence the effective range of a windbreak. An average windbreak will reduce the ground velocity of a 20-mile wind 10 per cent or more for a distance of about 30 times the

height of the trees. About one-fourth of this effect will be felt on the windward side of the windbreak and three-fourths on the leeward side. For example, if the trees are 40 feet high the total effective range with a 20-mile wind will be 30 x 40 or 1,200 feet, 300 feet of which will be on the windward side and 900 feet on the leeward side. The wind velocity is reduced by half at a distance of 500 feet. This means that with such a windbreak wind velocity is reduced for almost the entire length of a 40-acre field.

A few years ago European alder gained considerable popularity as a windbreak tree because it is a nitrogen-fixer like the legumes and does not rob the soil to the same extent as non-nitrogen-fixing species. At the present time stock is hard to obtain.

One consideration that should be kept in mind is that under certain circumstances windbreaks may cause air stagnation, which may increase temperature and humidity to a dangerous degree in summer or increase frost damage in spring and fall on small areas, particularly in hollows. Where this is likely to occur, windbreaks should be planted so as to guide the flow of air past such spots. Where these conditions develop after the windbreaks are established they may be relieved by judicious opening up of the windbreaks.

On the Nottawasaga Watershed, many types of windbreak and shelterbelt have been grown as the woodlots of the area have been cleared away for agriculture. In many cases, the typical trend of woodlot location on the watershed, on the half-lot line, has resulted in insufficient overall protection from wind; and buildings and fields have been left exposed as a result of great spaces in this woodlot pattern. Therefore, the use of windbreaks and shelterbelts is vital, particularly at the western end of the watershed where scarcely any tree cover is left.

However, the use of windbreaks and shelterbelts in a largely agricultural area requires that the spacing of trees and methods of management be designed to fit the type of agriculture being employed. The species of trees used must also be adapted to the site.

For livestock farming, initial plantings of fast-growing trees, followed by the planting of slower-growing but sturdier varieties in the spaces left, is a useful plan. It is sometimes found that animals tend to gather in the immediate lee of such shelter, thereby concentrating their manure too much in one spot. Pruning the bottom 6 to 8 feet of the windbreak will force the livestock to

This is a well placed shelter belt designed to reduce snow drifting on a main country road.

Bad control of cutting results in the regrowth of trash trees.

This slash has been lopped and scattered to insure that future regeneration can grow and to reduce the fire hazard.

scatter more over the field, and yet will still provide the necessary shelter.*

In areas where "cash cropping", particularly for vegetables on mucklands, is important, the planting of primary windbreaks on field borders and secondary windbreaks within the field is important to prevent the lifting of whole crops by wind.†

In Michigan, muckland farmers discovered some years ago that black willow, the common windbreak species used up to that time, provided the wrong kind of protection. It lost its lower branches and developed into a large tree with high branches that gave little ground protection. It also competed for nutrients and water from a large area on either side of the windbreak. Experiments over four growing seasons by the Lapeer Soil Conservation District determined that arctic willow and medium purple willow were the best plants for providing a complete intermediate wind-breaking effect. The latter, because of its narrow and upright growth form which leaves little space between plants at their bases and thereby reduces air passage through the windbreak, is considered slightly the better plant.

At present, primary windbreaks of trees such as Austrian, Scotch and white pine at minimum distances of 40 rods have been recommended for some time in Michigan. Intermediate windbreaks of shrubby species are being employed between the primaries on truck farms at about 150 to 200 feet spacing.**

Recently valuable work has been done and useful information obtained at the Ontario Agricultural College regarding wind and snow effects on farm buildings under varying conditions of wind direction and building location. These experiments have been performed using a specially constructed water flume that provides a means of accurately duplicating certain conditions in miniature and observing them at first hand. Efforts are now being made to obtain similar observations regarding the correct placement and design of windbreaks under varying topographical conditions.

Experience has shown that windbreaks are an asset to any farm, that their adverse affects, if any, are local and easily remedied, and that in many areas they are essential to the control of soil erosion by wind. It is therefore recommended that the Authority encourage in every way the establishment of windbreaks by private owners.

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* British publication "Farm and Country", 1960.

† "Climate Near the Ground", R. Geiger.

** U.S. Journal of Soil and Water Conservation, 1962.

6. Snow Fences

In the climate of Southern Ontario snow drifting may cause much inconvenience and sometimes hardship. Control can be readily effected by means of windbreaks and is dependent on proper placing with reference to lanes of travel and topographic features.

Where space is limited or land valuable, lath or board fences are frequently used, but the annual cost of erection, removal and maintenance of these can be eliminated by using trees as permanent windbreaks or shelterbelts.

The object of a snow fence is to mechanically reduce wind velocity near the ground in such a manner as to cause a drift to form where it will be least harmful. The reduction in velocity creates two pools of relatively calm air, a small one on the windward side and a much larger one on the leeward side, and it is here that drifts form, leaving the area farther to the leeward free of drifts and comparatively free of snow. As winds become stronger the wind reduction and the width of the calm pool on the leeward side will increase and the centre will tend to move farther away from the windbreak.

A wide belt of trees which will accumulate a large drift of snow on its windward side may be planted right to the edge of the road, the windward edge extending back a distance equal to three or four times the height of the trees, and generally at least 100 feet.

In some places the snow-trap type of windbreak is effectively used. It is composed of one or more rows of trees close to the road with a wide opening to windward and then a single row of trees. The single row arrests the first force of the wind and the snow is deposited in the opening. This has the advantage of requiring fewer trees than the shelterbelt and leaving the ground between open for cultivation in the summer.

Poor placement of windbreaks may accentuate drifting conditions. A single row of trees, unless it is a dense coniferous type, is seldom dense enough to completely stop winter wind, and may create drifts. Any prejudice which may exist against windbreaks for protection against drifting snow on roads arises from such poor or poorly placed windbreaks. If a windbreak has openings in it or if it ends abruptly, streamer drifts will form. Windbreaks should be kept dense and tapered down at the ends by using progressively smaller species of trees and shrubs to prevent the formation of streamer drifts.

Trees are being used successfully as snow fences in Ontario by the Department of Highways, by railways and by a number of counties. Every encouragement should be given to the establishment of such snow fences in place of the removable type of lath fence now in use.

## CHAPTER 7

## MARKETS AND MARKETING

Improvement of woodlots and planting of unproductive areas, as discussed in earlier chapters, are obvious means of increasing wood production. In addition, any woodlot owner should know enough about harvesting and marketing his products to get the most out of his present production.

The breadth of the market varies greatly with quality. For high-grade products such as veneer logs, buyers will come one hundred miles or more. For low-grade logs, 20 miles may be the limit, and often it is difficult to find a buyer at all.

This difficulty applies to all low-grade or small material, which the owner should remove to improve the growth of quality material in the woodlot. The market for fuelwood has declined sharply in the face of competition from other fuels but this use still remains of some importance. A pulpwood market for thinnings now exists. Recent advances in the pulp and paper industry have made it possible for some mills to use hardwood thinnings. This type of market does not promise large returns to woodlot owners, but does promise to defray the cost of woodlot improvements which will allow the progressive owner to produce the quality products from which his real profits are derived.

The importance of quality products is well illustrated by the comparison made in a Department of Lands and Forests news release which is quoted in part below:

> "There is no commodity produced on a farm which will vary as much as wood ... Our woodlots and pine plantations in Southern Ontario yield a variety of products. In order to compare their relative values, it is necessary to arrive at a price per cubic foot of wood for each product. The following prices should not be taken as exact, as they will vary with quality, quantity, ease of logging and the bargaining power of the landowner. However, these prices will serve to show a comparison of net values from various products. Fuelwood at $1.00 per short cord is worth about 4 cents per cubic foot. Pulpwood from pine thinnings at $2.00 per full cord is worth about 2½¢ per cubic foot. Cedar posts 8' long, having a 5" top at 20¢ each are worth about 10¢ per cubic foot. Small sawlogs 10-15" in diameter, of valuable species, such as hard maple, oak, ash, etc., at $40.00 per thousand board feet, Doyle Rule, are worth about 16¢ per cubic foot.
>
> "Large sawlogs of less valuable species, such as elm, beech, soft maple, averaging 20" in diameter, and valued at $25.00 per thousand, Doyle Rule, are worth about 17¢ per cubic foot.
>
> "Good quality sawlogs of hard maple, pine, oak, etc. averaging 20" in diameter at $60.00 per thousand board feet, Doyle Rule, are worth about 40¢ per cubic foot.

"Veneer quality logs of maple, oak, cherry, etc., averaging 22" in diameter at $90.00 per thousand board feet, Doyle Rule, are worth 65¢ per cubic foot."

1. The Timber Harvest

Harvesting of timber involves four operations: estimation of volume, cutting, skidding and hauling. The owner may perform all operations, selling his logs at the mill; he may cut and skid the logs, selling them at the roadside; or he may sell his timber on the stump.

(a) Estimating

Estimation of timber may be done either in the tree (cruising) or in the log after cutting (scaling).

Some operators cruise timber by rough ocular estimate; that is, by walking through the bush and estimating, on the basis of past experience, the number of board feet in the stand. The most accurate method would be to measure each tree, consider taper and defect, estimate and tally its volume. In large wooded tracts only a representative sample, say 10 per cent or 20 per cent, may be measured and the total estimated from this sample.

One example may illustrate the value of a tallied cruise. Some years ago, in competitive bidding for 87 acres of woodland, one operator estimated a stand, by tallying every merchantable tree, to be 700,000 board feet; the chief log buyer for a large furniture manufacturer estimated 350,000 board feet; another operator estimated 100,000 board feet. The actual cut from the stand was 746,000 board feet. Obviously such discrepancies are of concern to the seller as well as to the bidder who tries to maintain his place in competitive buying. Before selling standing timber, it would pay the owner to make a tallied cruise or, if necessary, to hire professional assistance for this purpose.

Similarly, when selling logs, the owner or his agent should assist in their measurement, try to understand the allowance which must be made for defects and assure himself that he is being fairly treated.

(b) Cutting and Skidding

In a typical hardwood operation, the value of logs at the roadside may be half as much again as that of logs in the standing tree. The difference is mainly labour cost.

By performing the operations of cutting and skidding, the farmer increases his return by selling his labour and use of his equipment instead of just his stumpage. The flexibility of woods work in fitting into otherwise slack seasons

on the farm should make this increased return particularly attractive. In addition, the farmer doing his own cutting is best able to determine that the right trees are removed and damage to the remaining stand kept as low as possible.

(c) Hauling

Truck-hauling has increased the distance from which mills can secure their logs. Cost per thousand board feet hauled depends largely on distance. Thus while grade 1 logs might be hauled up to 50 miles, the lower value of other logs might limit practical hauling distance to 15 or 20 miles.

While actual figures will vary greatly, the example below will suggest the change in log value at various stages.

| | |
|---|---|
| Value of Logs in the tree (stumpage) | $28 per M board Feet |
| Making logs from tree | 8 " " " " |
| Skidding logs to road | 6 " " " " |
| Hauling logs to mill | 8 " " " " |
| Value of logs in mill yard | $50 per M board Feet |

2. Timber Sales

(a) Outright Sale of Woodlot

Frequently a sawmiller finds the simplest procedure is to buy the woodlot or farm outright. In this case, the former owner has no further interest in the land. The practice of slashing such woodlots and leaving them to become tax-delinquent is legitimate cause for community concern. Where tree-cutting by-laws are rigidly enforced, this abuse should be kept under control.

(b) Sale of Cutting Rights

Under this method the owner sells the right to cut all timber of certain species down to a certain diameter; or the trees to be cut may be marked in advance and the sale made on this basis. Often only a very vague word-of-mouth agreement is made and misunderstandings are common. A simple written agreement such as that suggested later in this chapter would avoid this confusion.

A lump-sum method of payment is often used on such sales, based upon a volume estimate by the buyer. As mentioned in the section on cruising, the volume estimates of different bidders may vary considerably. The seller is therefore advised to consult the list of buyers of woodland products in the hands of the Zone Foresters and to obtain competitive bids from as many buyers as possible. On lump-sum purchases the buyer takes all the risk as to accuracy of estimates and quality of timber.

Selling the standing timber at a rate per thousand feet removes the uncertainty of volume estimates and requires measurement of the logs after cutting. Two uncertainties remain - the log rule to be used in measurement, and the assignment of logs to different grades which differ in prices per thousand board feet. For Provincial Government transactions the new Ontario Log Rule is now required, but for private sales there is no set standard, the Doyle Rule being most commonly used. The general adoption of the more accurate Ontario rule in timber transactions would be much in the interest of private timber owners on the watershed. The woodlot owner seldom knows the problems of processing logs into lumber sufficiently well to understand fully why the buyer assigns some logs to lower grades. Publication of price lists and grade specifications by log buyers would promote better relations with woodlot owners. Possible arguments and ill-feeling over these matters are factors in making some buyers prefer lump-sum purchase. The woodlot owner must decide whether to accept volume and grade risks in the hope of getting a better price by selling on a log measurement basis.

In the event that he chooses to be paid on a volume-removed basis, just what the buyer intends to cut and pay for should be absolutely clear. Only the best trees might be removed, and it is possible that only the best logs from these trees might be taken. This leaves the owner with many poor-quality logs which he cannot readily sell and with some poor trees standing which he wanted cut. The volume actually paid for might be small, and the woodlot owner's total realization on the transaction might be less than he would have received had he accepted payment in a lump sum.

No matter which of these two methods is chosen, a written Timber Sale Contract should cover the transaction. It should set forth all the details necessary as to prices, species, sizes, rights granted to the buyers, limiting dates, times of payment and so on.

(c) Owner-Made Logs

The woodlot owner who has decided to realize not only the value of his woodland product but also the additional labour income derived from its harvest prefers to take payment at a price per thousand board feet for logs placed on skids at the roadway or logs delivered to the mill. Here again the securing of competitive bids and a clear understanding with the buyer regarding log grade will avoid any feeling of unfairness in the deal. An owner who simply arrives at the mill with a load of logs may feel that he has to accept the offered price even though he is dissatisfied.

### 3. Timber Sale Contracts

During the conservation survey of 1961-62 it was estimated that 1,047 acres of woodland had been cut over in recent years. This acreage is exclusive of any area of county or municipal forests. The greatest cutting activity had been concentrated in Essa, Flos, Innisfil, Nottawasaga, Oro, Tecumseth, Tosorontio and Vespra Townships.

Recent cutting activity had been heavier in Innisfil and Tecumseth Townships due to clearing operations on mucklands prior to cultivation. Of the remaining townships it was felt that Flos was the most representative, since one of the larger total cut-over acreages was found in this township, distributed over 16 individual properties. Over 60 per cent of these woodlot operations had been "clear cuts", the remainder being partial cuttings.

The need for contracts governing woodlot cutting was in evidence since in most cases neglect of proper slash disposal had reduced the regeneration of useful tree species. Also in cases of cedar "posts and poles" operations, clear-cutting has been followed by heavy regeneration of poplar, a species which is already in ample supply on the watershed. Contracts for cutting should be drawn up with the conditions of the future forest stand in mind, particularly where the owner desires an improved future stand.

As an aid to people who are unfamiliar with timber sales agreements, a sample contract is given here. It shows the more important provisions that should be included in a contract for the sale of marked trees, to be scaled in the log. Substitute clauses are given for use in other kinds of sales. No single form of contract will suit all classes of sales, but owners of woodland timber should have no difficulty in adapting this contract to their use.

#### SAMPLE TIMBER SALE CONTRACT

Agreement entered into on this...................day of...........between...... ...............of...................hereinafter called the seller, and.............. ......of....................hereinafter called the purchaser.

Witnesseth.

ARTICLE 1. The seller agrees to sell the purchaser, upon the terms and conditions hereinafter stated, all the living timber marked or designated by the seller and all the merchantable dead timber, standing or down, estimated to be....... ........board feet, more or less, on Lot.....Con.....in the Township of............. County of..............and located on a farm owned by the seller and about.........

miles from................................................................................

ARTICLE II. The purchaser agrees to pay the seller the sum of..........more or less, as may be determined by the actual scale, at the rate of............per thousand feet.......................................................................

..........................................................................................

payable prior to the date of removal of material, in instalments of................ each.

ARTICLE III. The purchaser further agrees to cut and remove said timber in strict accordance with the following conditions:

1. Unless an extension of time is granted all timber shall be cut, paid for, and removed on or before.......................................................................

2. Saw timber shall be scaled by the...............log rule, and measured at the..........................................................................................

3. The maximum scaling lengths of logs shall be 16 feet; greater lengths shall be scaled as two or more logs. Upon all logs an additional length of 4 inches shall be allowed for trimming. Logs over-running this allowance shall be scaled not to exceed the next foot in length.

4. No unmarked timber of any kind shall be cut, except........................

5. Stumps shall be cut so as to cause the least possible waste - stumps of trees up to 16 inches in diameter, not higher than 12 inches above the ground, and those of trees above this size at a distance above the ground not greater than three-fourths of their diameter.

6. All trees shall be utilized in their tops to the lowest possible diameter, for commercially saleable material.

7. Young trees shall be protected against unnecessary injury; only dead trees and less valuable kinds may be used for construction purposes in connection with lumbering operations.

8. Care should be exercised at all time by the purchaser and his employees against starting and spreading of fire.

9. All slash shall be disposed of by the method of lopping and scattering.

ARTICLE IV. It is mutually understood and agreed by and between the parties heretofore mentioned as follows:

1. All timber included in this agreement shall remain the property of the seller until paid for in full.

2. In case of dispute over the terms of this contract, final decision shall

rest with a reputable person to be mutually agreed upon by parties to this contract, and in case of further disagreement, with an arbitration board of three persons, one to be selected by each party to this contract, and a third to be the Zone Forester or his chosen representative.

In witness whereof the parties hereto have hereunto set their hands and seal this.........day of..............19.....

Witnesses:

.................................  .................................

.................................  .................................

The following are sample clauses that should be substituted in the contract when other methods of sale are used. In lump-sum sales substitute in Article I a descriptive clause modelled on this one:

All merchantable living trees, except.................................. which measure 12 inches or less in diameter at breast height (a height of 4½ feet above the ground).

Such provision will reserve the basis of a second crop consisting of the more valuable and rapid-growing kinds of trees and remove all the inferior and slower-growing trees.

The payment clause in lump-sum sales should be varied to read somewhat like this:

The sum of..........dollars for said timber, payable prior to the cutting of the material, in instalments of..........dollars each, payable on or before ..............................................respectively.

4. Attempts at a Solution of the Marketing Problem

Orderly marketing of woodland products is to the advantage of the woodlot owner, the sawmill operator, and the ultimate industrial consumer who requires definite quantities of certain species in certain grades to carry on his manufacturing business. It has already been remarked that the farmer feels at a disadvantage in marketing logs, and his real or imagined grievances are a detriment to good relations between the buyer and seller of logs and a steady flow of logs to the market. The following attempts at improved marketing may suggest methods which could be applied in the Nottawasaga Valley.

(a) A Marketing Experiment near Doon

During the winter season of 1948 and 1949 the Department of Lands and Forests in the Hespeler District carried out an experiment in the marking and marketing of timber in an 18-acre woodlot near Doon. The project was initiated by

Mr. I.C. Marritt, then District Forester, and the field work was done by Mr. L.S. Hamilton, Zone Forester. The scheme is patterned after a marketing assistance method meeting good success in the State of New Jersey.

The mixed uneven-aged woodlot contained considerable large white pine and red oak. Initial investigations by the Department showed growth stagnation due to over-stocking and recommended the removal of certain trees representing the accumulation of growth over a number of years. Under this condition, removal of selected trees allows the remaining trees to grow at an increased rate. As growth again slows down, another cropping should take place. This is the simple principle of selective logging - the removal of accumulated growth periodically to keep the stand at a healthy, productive growth rate.

Upon explanation of the proposed marketing assistance, the woodlot owner entered into a signed agreement with the Department as a co-operator, agreeing not to sell or allow to be cut any trees except those marked, upon penalty of a nominal fine per thousand for the estimating and marking service of the Department.

The trees were marked with a view to a second marking which would be necessary afterwards to remove weed trees and trees of low value in order to give good growing conditions. Each tree marked for removal was blazed at breast height and below stump height, the stump blaze being branded to detect any unauthorized cutting. The total log scale estimated for the 223 trees marked was 47,600 board feet, Doyle Rule. The trees were listed as to species and diameter on a mimeographed form.

All the estimation data were turned over to a timber agent chosen by the Department. The timber agent entered in a written agreement with the owner to -

(1) Solicit tenders from buyers:

(2) Draw up a timber sale contract protecting the owner;

(3) Check on cutting operations; and

(4) Measure and collect payment for all wood cut before its removal from the property.

The agent was to receive a percentage commission of the gross sale value.

The timber agent mailed the volume estimate sheets to all local log buyers, giving location of the woodlot and inviting inspection of the bush.

The timber sale contract set forth the prices agreed upon for the different species, required that tops be worked into 4-foot wood to be paid for at an agreed price per standard cord, provided penalties for the cutting of unmarked

trees and required that the woods operation be conducted with a minimum of damage to the woodlot.

Prices realized by the owner were much better than the average paid in the area. Prices per thousand board feet, Doyle Rule, for the standing timber were:

| | |
|---|---|
| White and red oak | $62 |
| White ash, soft maple, hard maple, basswood and cherry | $60 |
| White pine | $55 |
| Hemlock | $45 |
| Beech | $30 |
| Fuelwood | $4 per standard cord |

The experiment was considered very successful by all the parties concerned, yielding about 2,000 board feet more than estimated, and the woodlot has been left in fine growing condition with an expected second cut in 15 or 20 years of 25,000 board feet.

(b) <u>The Lanark County Co-Operative</u>

This co-operative was set up by a group of woodland owners in the County of Lanark in March, 1950. Its objective is the better management of privately-owned woodland to ensure a continuous yield of the best material possible from the forested land of the members through profitable marketing of all the woodland products.

To put the woodland enterprise on a paying basis to the individual, it is necessary to market not only the material suitable for lumber manufacture and special products such as veneer, but also the inferior products such as the poorer hardwood species, low-grade hardwood logs of the better species, small softwood products such as cedar posts and poles and that material removed in improving a woodlot during what may be called sanitation cutting. It was felt that the advantages of co-operative action by woodland owners in the field of marketing would best solve the problems of the individual, particularly in respect to inferior or small products. Acting as a group rather than individually and through a member active in contacting prospective buyers, they can hope for recognition by the buyers in the area as a stable source of the various woodland products.

The establishment of the co-operative followed an extensive educational campaign carried on by fieldmen of the Federation of Agriculture and the Department of Lands and Forests and the local Farm Forum leader. Interest was aroused

through moving pictures, talks at schools, local evening meetings, press releases, radio programs and public speaking competitions on woodlot management. Meetings held at Lanark were attended by officers of the Department of Lands and Forests, representatives of pulp and paper companies, sawmills and other wood-using industries, and members of agricultural organizations. Gradually a workable plan was evolved, and the Lanark Forest Co-operative was set up under a number of directors with Mr. Herb Paul as manager.

Mr. Paul, of Lavant, the main force behind the formation of the co-operative, is an energetic leader of the local Farm Forum, caretaker of the Lanark County Forest, a farmer, and owner of several hundred acres of woodland in Lavant Township. As manager of the co-operative his duties entail the location of markets for the woodland products of the members, arriving at satisfactory price schedules, collection of payment for products, ensuring that products are ready or delivered at the time promised and advising members on cutting their woodland according to best forestry practices.

The co-operative had a membership of approximately 60 in the fall of 1950. By April of 1959 the membership had grown to about 250 with an average holding per member of about 200 acres. This membership has been maintained to date and some members have become interested in becoming certified tree farmers. A lifetime membership fee is $5 and in addition the co-operative receives a commission of 5 per cent of the sales. An indication of the success of this venture is the fact that the co-operative has accumulated enough funds to make advances to producing members while wood or logs are being manufactured.

At present the co-operative has no intention of undertaking a manufacturing endeavour such as a sawmill for lumber or railway ties. Logs are not accumulated at a central point and sorted as to species and a grading standard, but are handled direct from woodland to buyer. The purchaser's measure of the volume, by grade where it might apply, is accepted as the basis for payment on transactions.

In addition to its main function of promoting forest conservation and finding markets at the best prices for forest products, the co-operative has other activities. Since 1954, with financial aid from two prominent pulp and paper companies, the co-operative has sponsored a woodlot management competition among its members. Winners in the competition are honoured at an annual banquet and given framed certificates and cash awards. In 1956 the co-operative formed a tree farm committee in Lanark County and this project has resulted in 25 woodland owners being

certified as tree farmers by the Canadian Tree Farm Committee.

It would seem that the Lanark Forest Co-operative has progressed a long way toward accomplishing its objectives of promoting the better management of privately owned woodland and of benefiting its members through profitable marketing of all woodland products. Such an organization not only promotes good conservation practices but also benefits the economy of the community. It is recommended that the Nottawasaga Valley Conservation Authority encourage its woodland owners in the formation of a similar co-operative, and give its full support and co-operation to such an enterprise.

# WILDLIFE

## CHAPTER 1

## INTRODUCTION

The scope of this survey was limited to four aspects of conservation in which Conservation Authorities may wish to influence public thinking and action concerning fish and wildlife. These aspects are as follows:-

(1) Certain conditions which affect the productivity of game fish in the many streams in the watershed.

(2) The trend towards posting of streams in the watershed against trespass or fishing by the public.

(3) Possible improvement of the conditions for wildlife on farms.

(4) A list (for the benefit of naturalists who live in or visit the Nottawasaga Valley) of what species they may expect or hope to see in the region.

The foregoing aspects, of course, do not by any means include all the aspects of fish and wildlife management. The Fish and Wildlife Branch of the Department of Lands and Forests carries out the management of the fish and wildlife resources of the Province, and the Research Branch of that department is constantly uncovering new factors on which the management of fish and wildlife can be based.

The abundance of wildlife is partly controlled by conditions of the soil, climate and vegetation and the availability of water, which, taken together, may be classed as the habitat or living quarters of the species. Competition, disease, predators and man's activities are the additional factors which affect the numbers of fish and wildlife.

## CHAPTER 2

## PHYSIOGRAPHY AND RIVERS

There is a great variety of soils, physiographic conditions and vegetation in the Nottawasaga Watershed. The area over which the Conservation Authority has jurisdiction includes, besides the Nottawasaga drainage, a series of small streams which drain into Nottawasaga Bay east and west of Collingwood. The more significant of these streams are the Batteaux River, the Pretty River and Silver Creek.

The limestone cliffs of the Niagara Escarpment are important features affecting the streams from Osler Bluff, near Collingwood, to Singhampton and thence to the upper waters of the Noisy River near Maple Valley. A further section of the escarpment, mostly covered by till soil, occurs north-eastward from Honeywood in Mulmur Township. There are rock outcrops near Hornings Mills and again near Mono Centre in Mono Township and in some tributaries draining into the Nottawasaga River in the Hockley Valley.

A large area of sand plain stretches from Bailey Creek, west of Beeton, north to Alliston, and (including Camp Borden) covers the land northward almost to New Lowell and Brentwood. An extension of this sand plain stretches through the north-east part of Essa Township almost as far as Barrie. The sand plain continues through Midhurst and along the edges of Willow Creek in Vespra Township. There is also a narrow area of sand plain along the coast of Georgian Bay. A large area of spillway with gravelly and sandy soils lies west of Camp Borden in Tosorontio Township.

A third major feature of the watershed affecting the condition of the rivers is the large clay plain which stretches in an arc from Brentwood in Sunnidale Township north-eastward to Anten Mills. East of this clay plain the Minesing Swamp with bog soils occupies a large part of Vespra Township, including the lower course of Willow Creek. The muddy runoff from the clay plain has a noticeable effect on the turbidity of the lower part of the Nottawasaga River.

Most of the remainder of the watershed is covered by various types of till soil, with mixtures of sand, gravel, stones and clay. The section between Collingwood and Highway 400 includes stretches of the shore of the former Lake Algonquin, and these are reflected in the many beaches of the former lake.

The Nottawasaga River proper rises in various small trout streams

north and north-east of Orangeville and supplies good trout fishing down to a point some two miles east of Hockley. There are, however, several small falls which are impassable to fish. The river is well entrenched in Essa Township, giving good drainage to the sand plains adjacent. The Pine River rises west of Hornings Mills, at which point it becomes a spectacular trout stream flowing at the base of very rugged wooded hills. It passes through Mulmur Township in a narrow and chiefly swampy valley. Three miles north-east of Mansfield the river leaves the hills behind, and then passes with a winding course through woodlands to the sand plains of Camp Borden and thence to the Nottawasaga River near Angus.

The Mad River rises in swamps in the area north of Badjeros in Osprey Township. It drops rapidly down the Devil's Glen, east of Singhampton, and shortly reaches Glen Huron, where a mill-dam makes a large impoundment, warming the water and also causing daily interruptions of its flow. The Noisy River, its chief tributary, is a much better trout stream, continuing as uninterrupted trout water to its junction with the Mad River, west of Creemore.

The Pretty River cuts through a spectacular semi-circular barrier (the Banks moraine), and most of its course runs through gravel deposits.

Coates Creek is a difficult stream to classify because it was found to contain the pumpkinseed which is usually found in warmer water. The proposed rebuilding of the dam at New Lowell will in any case make much of this stream unsatisfactory for trout.

Bear Creek rises in swampy land in the eastern part of Essa Township. A continuous recording thermometer indicated that virtually all of this tributary is trout water, although brook trout were caught at only two stations on this stream.

Willow Creek rises from various springs in Medonte, Flos and Vespra Townships, and provides some of the best trout fishing in the region. However, in its lower course it flows through the Minesing Swamp and is virtually inaccessible to fishermen.

## CHAPTER 3

## STREAM SURVEYS

### 1. Environmental Conditions for Certain Species of Fish

Since one of the major purposes of this report is to map the present distribution of fish, particularly the brook trout, some mention must be made of the conditions required for the existence of this species.

Although the environmental relations of brook trout are by no means entirely understood, two of the physical and chemical factors - temperature and oxygen relationships - have received much attention and probably are the most decisive in determining the success of the species in streams.* Hydrogen ion concentration, measured as pH, and carbon dioxide levels have also been closely examined, but it does not appear that the variations in these factors in the Nottawasaga Watershed are sufficient to bring either factor close to the lethal limit for brook trout. It is sufficient to state that brook trout tolerate a wide range of pH, varying from pH 4.1 to pH 8.5. So far as oxygen is concerned there does not appear to be sufficient pollution in any of the streams which are cool enough for brook trout to allow this factor to be significant in the watershed. Pollution, so far as fish are concerned, is virtually non-existent in this watershed, although there has been some question of the quality of the effluent from the R.C.A.F. station at Camp Borden. We are therefore left with temperature as the controlling factor in this area.

It has already been well established by testing fish in the laboratory that the best temperature range for activity and growth of brook trout lies between 55° and 66°F. (13° to 18°C.) It has also been demonstrated in the laboratory that the lethal temperature varies according to the temperature at which the fish have been "acclimated", or left for some time, but this "acclimation" temperature is never found to be constant in streams, all of which vary diurnally. It has therefore been decided arbitrarily that streams in which the temperature does not rise above 75°F., or in which insects are found which are not normally present in streams having temperatures above 75°F., may be considered as suitable for brook trout.

Two examples of this situation may be given. At Station 6 on the accompanying map (on Sheldon Creek in Adjala Township) the temperature of the stream

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* Fry, F.E.J. Some Environmental Relations of the Speckled Trout (Salvelinus fontinalis). Proceedings of the N. E. Atlantic Fisheries Conference, May 1951.

was recorded continuously for 1,491 hours. Of this period the temperature for 855 hours lay within the preferred temperatures for brook trout. During almost all of the remaining hours the temperature was within the normal tolerance limits for brook trout. But all of these satisfactory temperatures were presumably nullified by a period of 3 hours on July 8, 1962, during which the stream temperature rose to 78°F., which must be considered lethal for brook trout. Both the occurrence of insects and the species of fish found substantiated these findings. No brook trout were found in the stream.

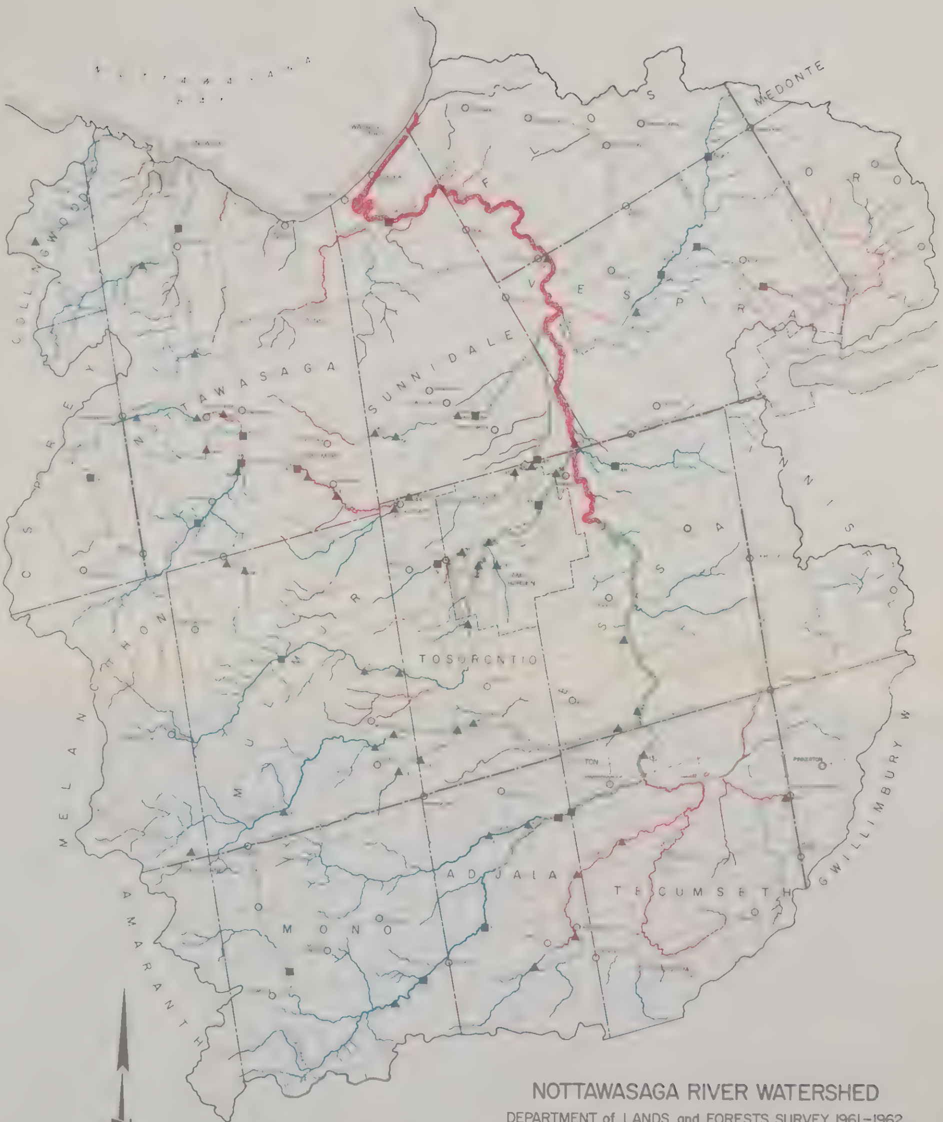
The high stream temperature was caused by a prolonged warm spell in which the air temperature in the shade at the nearest meteorological station reached the following maxima: July 5 - 84°F., July 6 - 85°F., July 7 - 91°F. and July 8 - 94°F. The fact that no brook trout were found in this stream even before the period of extreme heat suggests that this condition recurs in this stream almost every year, and the meteorological records indicate that the high temperatures recorded would be exceeded in some years.

This situation may be contrasted with that at Station 24 shown on the accompanying map. This station is on the Pine River in Mulmur Township. Here a recording thermometer installed for 1,260 hours in the warmer part of the summer showed a total of 1,171 hours, or 92 per cent of the total, during which the stream temperature lay within the preferred temperature for brook trout. At no time did the stream temperature rise above 67°F. The stream is of course almost ideal for brook trout so far as temperature is concerned, and although some minor stream improvements might be made it is in all respects one of the best trout streams in the watershed.

The preferred conditions (in streams) for rainbow trout and brown trout are very similar to those for brook trout. The lethal temperature limits all lie within 1 or 2 degrees as experimentally determined. However, since the rainbow trout is a migratory species it is found in the fall, winter and spring in sections of streams which in the summer are much too warm for brook trout. Although the lethal limits for the three species are almost identical, brown trout and rainbow trout both thrive in temperatures 2 or 3 degrees warmer than those preferred by brook trout.

2. Methods

It has already been mentioned that the area under the Authority's jurisdiction includes several other streams besides the Nottawasaga River. The




# NOTTAWASAGA RIVER WATERSHED

DEPARTMENT of LANDS and FORESTS SURVEY 1961-1962

SHOWING

## BIOLOGICAL CONDITIONS OF STREAMS

(COMMON SUMMER CONDITIONS)

LEGEND

PERMANENT FLOW COLD TEMPERATURE NOT ABOVE 75°F IN SUMMER
FAVOURABLE TEMPERATURES FOR BROOK TROUT, BROWN TROUT MAY ALSO BE FOUND IN THESE WATERS

PERMANENT FLOW COOL TEMPERATURE CLOSE TO OR ABOVE THE UPPER LIMIT
SUITABLE FOR BROOK TROUT WHICH MAY BE KILLED IN WARM SUMMERS BROWN TROUT MAY THRIVE BETTER IN THESE WATERS

PERMANENT FLOW WARM [illegible]
RAINBOW TROUT MAY BE FOUND IN ANY OF THE WATERS WITH PERMANENT FLOW TO WHICH THEY HAVE ACCESS IN THIS REGION

DRIES TO STANDING POOLS (IN MOST SUMMERS)

[illegible]

▲ MAXIMUM - MINIMUM THERMOMETER

■ CONTINUOUS RECORDING THERMOMETER

procedure here adopted followed closely that used in previous surveys made by the Conservation Authorities Branch in other river systems. The rivers and their tributaries were examined at "stations" from half a mile to four or five miles apart on each stream course. The erosion, vegetation, volume of flow, turbidity, temperature and type of bottom were listed for each station. At all suitable stations collections of the aquatic insects and other invertebrates were made and at most stations collections of fish were also made. The collections were classified and used in zoning the various sections of the river. The nymphs of certain species of insects are confined to waters which remain cold and usually clear in summer, such as brook trout waters. Certain species of the genus Baetis of the mayflies are the most useful for this purpose. Other species of various genera are indicators of permanent flow or of polluted water or of high maximum summer water temperatures. The fish collections and records of eleven maximum-minimum thermometers and of four continuous recording thermometers substantiated these findings. The maximum-minimum thermometers were installed at 46 stations and the recording thermometers at 22 stations and both types were left in place for several weeks or in some cases several months, and were examined once or twice a week.

The present criteria were developed from more intensive year-round research carried out by Dr. F.P. Ide of the Department of Zoology, University of Toronto.* The analysis by J.B. Hallam† of previous river surveys by this Branch was also useful. The streams were examined between May 28 and September 6, 1961, and many of them were examined only once. It was therefore necessary to rely partly on deductions made from the presence or absence of species known to be reliable indicators.

The permanence of flow of the main rivers and streams and an indication of the summer water temperatures as they affect the distribution of fish are shown on the accompanying map "Biological Conditions of Streams". The greatest daily fluctuations in temperature are found in sections coloured green. Brook trout

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* Ide, F.P. The Effect of Temperature on the Distribution of the Mayfly Fauna of a Stream: University of Toronto Studies, Biology 39, Ontario Fisheries Research Laboratory Publication 50, 1935.

Ide, F.P. Quantitative Determination of the Insect Fauna of Rapid Water. University of Toronto Studies Biology 47, Ontario Fisheries Research Laboratory Publication 59, 1940.

† Hallam, J.B. Habitat and Associated Fauna of Selected Species of Fish in Ontario Streams, M.A. Thesis, University of Toronto 1954.

may inhabit some of the green sections, but will either move to cooler sections or be killed in periods of hot weather. The areas coloured in red, if they have good volume of flow, may contain largemouth or smallmouth bass, walleyes or pike and will almost invariably contain large numbers of suckers, catfish and many other small species of fish.

## CHAPTER 4

## FISH DISTRIBUTION

The following 41 species of fish were found in the rivers and streams of the Nottawasaga valley during the summers of 1961 and 1962. Species of particular interest to anglers are starred.

| Fish Species | No. of Stations Where Collected |
|---|---|
| **Petromyzonidae - lampreys** | |
| American brook lamprey | 1 |
| Northern brook lamprey | 3 |
| **Salmonidae - salmon** | |
| *Rainbow trout | 65 |
| *Brown trout | 7 |
| *Brook trout | 123 |
| **Esocidae - pikes** | |
| *Northern pike | 8 |
| **Umbridae - mudminnows** | |
| Central mudminnow | 21 |
| **Catostomidae - suckers** | |
| White sucker | 175 |
| Redhorse sp. | 2 |
| **Cyprinidae - minnows** | |
| Northern redbelly dace | 59 |
| Lake chub | 1 |
| Carp | 1 |
| Brassy minnow | 5 |
| Northern pearl dace | 57 |
| Golden shiner | 1 |
| Emerald shiner | 4 |
| Common shiner | 135 |
| Blacknose shiner | 2 |
| Spottail shiner | 8 |
| Bluntnose minnow | 61 |
| Fathead minnow | 46 |
| Blacknose dace | 208 |
| Sand shiner | 2 |
| Finescale dace | 2 |
| Longnose dace | 99 |
| *Creek chub | 233 |

| Fish Species | No. of Stations Where Collected |
|---|---|
| **Ictaluridae - catfishes** | |
| *Brown bullhead | 1 |
| **Gadidae - cods** | |
| *Burbot | 1 |
| **Percopsidae - trout-perch** | |
| Trout-perch | 11 |
| **Centrarchidae - sunfishes** | |
| *Rock bass | 6 |
| Pumpkinseed | 2 |
| *Smallmouth bass | 4 |
| *Largemouth bass | 3 |
| **Percidae - perches** | |
| *Yellow perch | 2 |
| *Walleye | 3 |
| Iowa darter | 1 |
| Johnny darter | 85 |
| Logperch | 3 |
| **Cottidae - sculpins** | |
| Mottled sculpin | 59 |
| Slimy sculpin | 9 |
| **Gasterosteidae - sticklebacks** | |
| Brook stickleback | 97 |

Some comments on the abundance and distribution of fish species here follow.

Brook trout are extremely common in almost all of the tributaries which rise on or near the escarpment on the western edge of the watershed, and also in the upper waters of Bailey Creek, Beeton Creek and Willow Creek. The distribution of the major game fish species, as indicated by seine collections, is shown on the accompanying map.

Brown trout were found chiefly in the Hockley Valley stream.

Young rainbow trout were found in almost all of the cooler streams to which they have access. The history of this introduced species in the Great Lakes and tributary waters is of interest. The species was first placed in streams tributary to Lake Superior by the United States Fisheries Commission in 1895. Rainbow trout were planted in the Sydenham River in Grey County about 1904 by Mr. John Miller. A four-pound specimen was caught south of Manitoulin Island in 1904, presumably from the Lake Superior introduction. The Ontario Department of Game and Fisheries began a widespread stocking of the species in 1918. Radforth* states: "The Pine River, a tributary of the Nottawasaga River, is one of the few rivers in which rainbow trout larger than a foot in length remain throughout the year". This statement may well be still true.

At present, rainbow trout are blocked from ascending the following tributaries:

1. The Scotts Falls tributary of the Nottawasaga at the falls in Mono Township.
2. Sheldon Creek, one mile west of Sheldon.
3. The tributary two miles south of Sheldon Creek.
4. The Boyne River, two miles south of Mansfield.
5. The Noisy River, at Dunedin.
6. The Mad River, at Glen Huron.

Rainbow trout were not collected or observed in tributaries of Innisfil Creek, Bailey Creek or Willow Creek, to which they have access. All three species of trout are taken in tributaries of the Mad River and the Pine River in Camp Borden, but the fishing, which is considerable, in Camp Borden is not included in this report. It should, however, be added that seven different stream improvement

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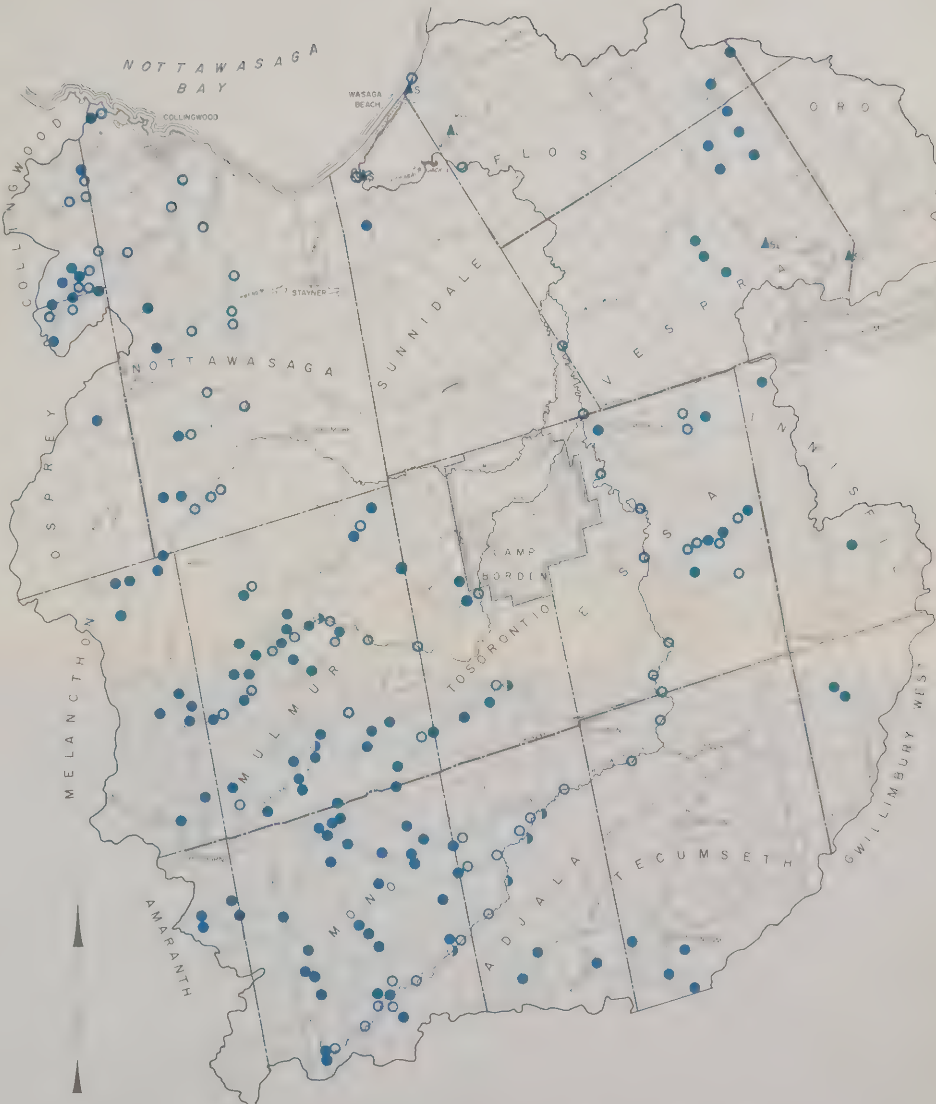
* Radforth, Isobel. Some Considerations on the Distribution of Fishes in Ontario. No. 25, Contributions of the Royal Ontario Museum of Zoology.




# DISTRIBUTION of SOME GAME FISH

CAUGHT on the SURVEY in 1961

LEGEND

- BROOK TROUT
- BROWN TROUT
- RAINBOW TROUT
- S SMALLMOUTH BASS
- L LARGEMOUTH BASS

projects for fish were being carried out in Camp Borden in 1961-62, and there is a very active fish and game club in the camp.

One of the noticeable features of the map of "Distribution of Game Fish" is the lack of collections of bass, walleyes and pike in the central and lower sections of the main stream of the Nottawasaga. This lack is probably due, not to the scarcity of fish, but to the lack of suitable equipment for surveys in the wide and deep part of the main stream. But there are numerous reports of game fish in this part of the river. A single reliable observer (B.W. Young) has caught many rainbow trout, walleyes, smallmouth bass and yellow perch in the river at the lowest rapids where the final bend north-eastward occurs, and has seen sturgeon lower down near the mouth. It is not by accident that the rapids mentioned above are called "Sturgeon Rapids", and it can be presumed that sturgeon formerly spawned there, and perhaps occasionally still do so. From other reports it is clear that the walleye and smallmouth bass both occur also in the deeper parts of the river near Edenvale.

## CHAPTER 5

## POSTING OF STREAMS

There is an alarming increase in the posting of streams against fishing in the Nottawasaga River and its tributaries. This results naturally from the fact that there has recently been a great increase in the number of private clubs and private individuals (mostly from the Toronto and Hamilton area) who have acquired land containing trout streams.

All except the smallest streams were examined in detail, and the results of this investigation are shown in the following table:

Mileage of Posted Waters

| Stream | Posted | Not Posted | Total |
|---|---|---|---|
| Nottawasaga River | 14.0 | 66.0 | 80.0 |
| Lamont Creek | | 8.2 | 8.2 |
| Tributary of Lamont Creek | 0.8 | 5.6 | 6.4 |
| Marl Creek | | 2.0 | 2.0 |
| Black Creek | 1.8 | 5.4 | 7.2 |
| Willow Creek | 1.8 | 16.0 | 17.8 |
| Tributary of Willow Creek | 1.6 | 6.8 | 8.4 |
| Valet Creek | 0.4 | 6.0 | 6.4 |
| Mad River | 9.8 | 30.0 | 39.8 |
| Coates Creek | 1.2 | 12.4 | 13.6 |
| Noisy River | 7.2 | 3.4 | 10.6 |
| Tributary of Mad River | 0.2 | 5.6 | 5.8 |
| Bear Creek | 1.6 | 9.4 | 11.0 |
| Pine River | 22.0 | 7.8 | 29.8 |
| Innisfil Creek | 2.4 | 17.4 | 19.8 |
| Sheldon Creek | 5.8 | 5.6 | 11.4 |
| Bailey Creek | 8.6 | 7.8 | 16.4 |
| Beeton Creek | 3.4 | 9.6 | 13.0 |
| Penville Creek | 0.6 | 6.0 | 6.6 |
| Boyne River | 12.4 | 12.4 | 24.8 |
| Keenansville Creek | | 4.8 | 4.8 |
| | 95.6 | 248.2 | 343.8 |

These posted areas are also shown on the accompanying map.

It will be noted from the above summary that 95.6 miles out of a total of 346.8 miles of stream examined in this area are already posted. The proportion of trout streams posted is of course much larger than the proportion of all streams which is given above, and is likely to be about 40 to 50 per cent. This represents a very serious disappearance of what were formerly considered to be useful streams for public fishing. These streams were always privately owned but formerly no objection was raised by the owners to fishing in them. There are now excellent reasons to expect that unless some streams are opened to public fishing the whole of the Nottawasaga trout waters and all of the cool or cold tributary streams will shortly be closed to the public.

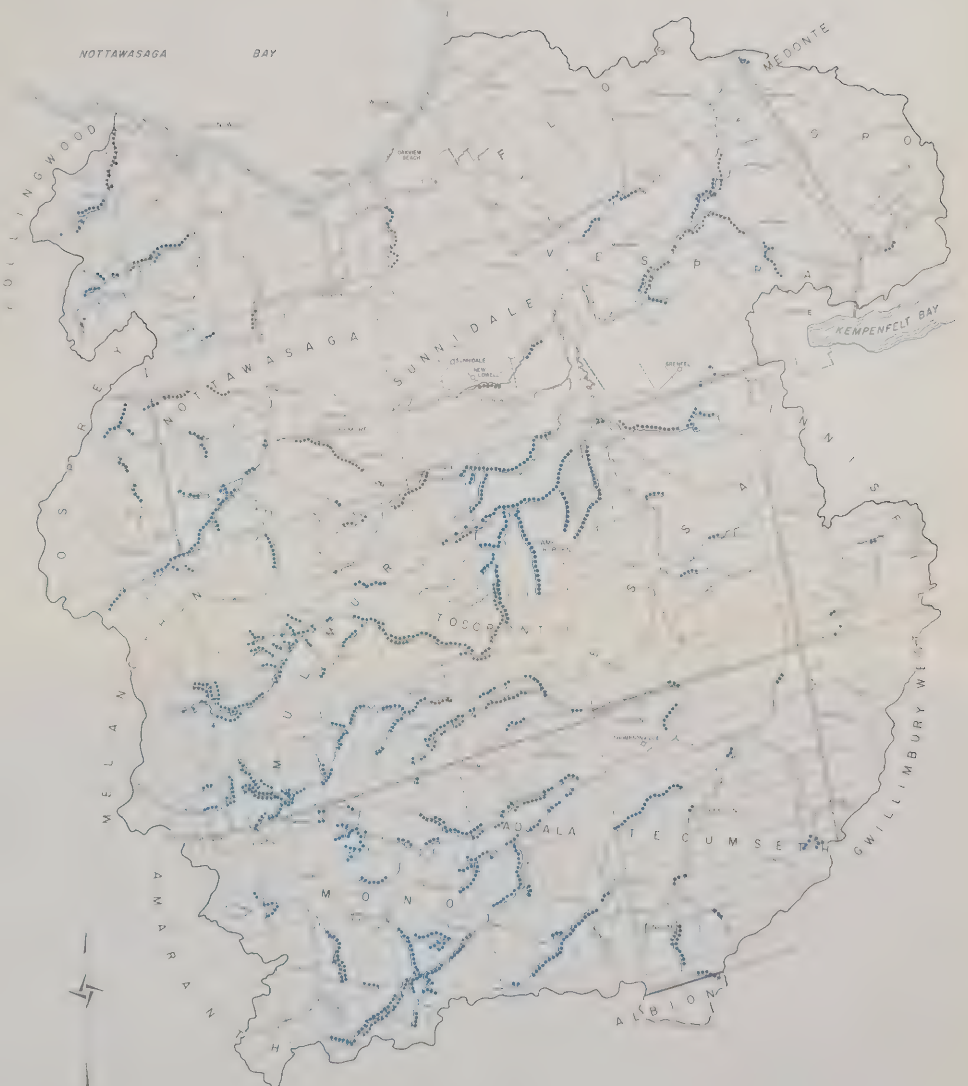
Before any discussion of possible remedies of this situation is made, the exact legal status of the posting of streams described above must be defined.

The following excerpts are taken from Section 66 of The Game and Fisheries Act, in the Revised Statutes of Ontario, 1962:

> "Subsection (2)
>
> "No person shall hunt or fish or with any gun or sporting implement, fishing rod or tackle in his possession go upon any enclosed or unenclosed land or water after he has had notice not to hunt or fish thereon by the owner either by word of mouth, in writing or by posters or signboards so placed that they may be observed from any point of access to the land.
>
> "Subsection (5)
>
> "Every person found contravening subsection 2 may be apprehended without warrant by a peace officer or by the owner of the land on which the contravention takes place, or by the servant of, or any person authorized by, such owner, and be taken forthwith to the nearest justice of the peace to be dealt with according to law."

It is also stated in the same Act that "No person shall tear down, remove, deface, or interfere with any poster or signboard placed pursuant to Subsection (2)".

The question of what constitutes "any point of access" to land is obviously an important one, since legally a gate or even a fence may be considered a point of access. It appears therefore that much of the "posting" of streams in the Nottawasaga Valley and elsewhere does not comply with the requirements under The Game and Fisheries Act. Where it is suspected that there may be difficulty in obtaining a conviction under the above Act, recourse might be taken to The Petty Trespass Act (Revised Statutes of Ontario, 1960, Chapter 294), in which the matter of trespass is more broadly defined.




# POSTED WATERS
AND
SECTIONS SUITABLE FOR STREAM IMPROVEMENT

## CHAPTER 6

## MEANS TO INCREASE TROUT FISHING FOR THE PUBLIC

There are basically four ways by which the opportunity for public fishing in the Nottawasaga Valley may be increased. These are as follows:

1. Acquisition of streams for public fishing and their improvement
2. Construction and stocking of trout ponds
3. Stocking of publicly owned streams
4. Improvement of streams by their owners and the renting of fishing privileges to the public.

### 1. Acquisition of Streams for the Public

Several States south of the international border and close to Ontario, for example New York State, Michigan and Wisconsin, have already embarked on large-scale acquisition of leases or easements of good stream fishing waters for the public. The tendency after much experience is for the policy to be that of easements rather than leases. In a typical case in Wisconsin, in a drainage basin of 30,000 acres, most of the streams are now fenced from cattle and stiles are built for access by the public. In this case the fencing is done at no cost to the landowner. Where necessary, stream improvement measures such as stabilization, planting and deflectors are installed to improve the fish habitat.

The control and development of streams by the State of Wisconsin for public use is well accepted by the landowners. They feel that it adds to the value of their property. Where some landowners have held out against entering into an agreement with the state for stream control (there is no pressure to do so on the part of the state) they have been criticized by their neighbours for being "holdouts". There is considerable community or "watershed association" pride in having all landowners on a stream enter into agreements. The easement is a legal device which is written into the owner's deed. The landowner receives no money for this easement.

The Nottawasaga Valley Conservation Authority might well take the lead in preserving some of its streams for the public.

It is recommended that the Authority negotiate easements on various trout streams for public fishing.

## 2. Construction of Trout Ponds

The most effective means of increasing trout waters in the Nottawasaga Valley is undoubtedly the construction of ponds on streams.

There are many small trout ponds on tributaries of the Pine River in Dufferin County. Four of these were examined in detail by W.E. Ricker in 1932.* However, no recommendations were made for their improvement. All four ponds are privately owned and one of them includes a fish hatchery.

The first point to be noted with respect to trout ponds is that no dam, fish ladder or obstructing device can be placed in a stream without the plans for it being approved by the Surveyor-General of the Department of Lands and Forests of Ontario. Where water is to be withdrawn or the flow stopped for a time, permission must also be obtained from the Ontario Water Resources Commission, specifying the date and time at which the water will be withdrawn or the flow stopped.

The ideal pond adapted to the production of brook trout or brown trout is the cool pond with continuous inflowing water and maximum temperatures at the surface of 70° to 75° F. with cooler bottom water. Such ponds are usually placed near the headwaters and they range in size from about an acre to eight or ten acres. The depth should be ten feet or more in the deepest part and the sides of the pond should be steep. A spring flow of as low as half a cubic foot per second will maintain a pond of one acre.

Ponds inevitably have the effect of warming the water in a stream. An extreme case of this can be seen on Silver Creek in the Nottawasaga Valley. Three large ponds have been excavated. These are shallow ponds and have obviously been constructed with little regard for the proper depth for trout. The temperatures of the inflowing water and the outflow were measured during the survey, with the startling results that the inflowing water was found to be 47° F. and the outflow was at 73° F., close to the lethal limit for trout.

In a properly constructed trout pond the outlet of each dam should be a pipe (with a screened inlet at the bottom of the pond) rising close to the normal surface level and there passing through the dam, so that cold water is drained from the bottom and the warm surface water is not allowed to flow over the dam. The surface water in the ponds serves as an insulating layer, and the

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* Ricker, W.E. Studies of trout producing lakes and ponds, University of Toronto Publications, Ontario Research Laboratories, No. 45, 113-167, 1932.

water below the pond has scarcely been heated by its passage through the pond. The pipe should be of such a size as to discharge the minimum summer flow. In time of flood the additional flow would pour over the dam at a suitable outlet, or be carried around it by a grassed spillway. A more efficient but rather more expensive method of passing the bottom water from a pond downstream is illustrated in the accompanying drawing, shown both in section and plan. Two series of stop logs are used, and the highest stop log is used to adjust the flow. Using this method the pond can also be drained if needed.

The by-pass type of pond has two particular advantages for the production of either brook trout or brown trout. A pond of this class is built close to but not on a permanent stream, and gets its name from the fact that the water supply is by-passed through a pipe from the stream to the pond. The first advantage is that there is no danger of the pond filling up with silt, because any excessive runoff goes down the permanent stream channel and not through the pond. The other advantage is that by controlling the amount of cold water entering the pond the temperature of the pond may be adjusted to give the maximum growth rate in the fish kept there.

Trout ponds do not normally have spawning beds for trout and, therefore, must be managed on a put-and-take basis, i.e., stocked artificially.

Warm water ponds are discussed in detail in the chapter "Improving the Farm for Wildlife".

## 3. Trout Pond Improvement

An example of the kind of work needed to deal with trout ponds can be seen from the following discussion concerning Bowerman's Pond, four miles south-west of Alliston.

A study was made of the Bowerman Pond during the survey to attempt to determine the cause of the low trout production and the apparent over-production of algae.

### (a) Description

The pond has a total surface area of approximately 4.2 acres and a maximum depth of seven feet. The depth can be varied quite easily by removing or installing stop logs in the outlet.

Near the centre of the pond is a large island. The section of the pond west of the island is shallow and that east of the island is deep. Although the two sections are joined, their physical and ecological conditions vary greatly,

and on this basis the sections should be considered as two separate units. The water temperature at a depth of three feet in the western section was warmer than water at a depth of two feet in the eastern section. Algae growth was also more abundant in the western section. The pond is supplied with water by a stream with a flow of approximately .75 cfs.

(b) Materials and Methods

Samples of algae were collected from different areas of the pond. They were put into vials for identification at the laboratory.

The pond was fished by means of a 100' x 8' minnow seine. Three pulls were made through the deeper section of the pond. All trout caught were marked by clipping the right pectoral fin. It was planned to fish the pond again in a week or two and to use the Lincoln or Petersen index to estimate the total population of trout.

However, many undesirable characteristics were quite evident from first observations, and any estimate of the trout populations would be of little value, since it is known that the trout population is extremely low.

The pond was lowered approximately 2.5 feet below normal to facilitate fishing.

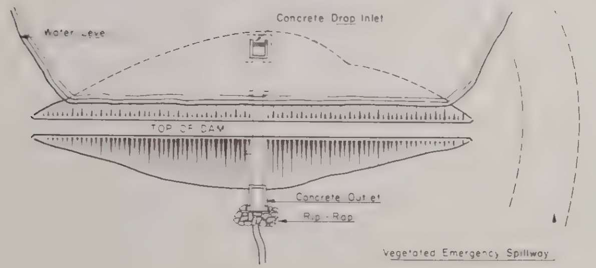
(c) Observations

The algae present in the pond belong to the family *Zygnemataceae.* They had a very high density in the shallow section of the pond, but were much less abundant in the deeper section. They were almost non-existent along the eastern bank after draw-down, but were two to three inches thick along the western shore. The algae increase the turbidity of the pond.

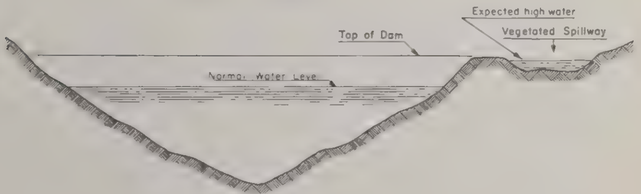
Table I shows the species of fish taken from the pond. Total number of each species is recorded only for significant species.

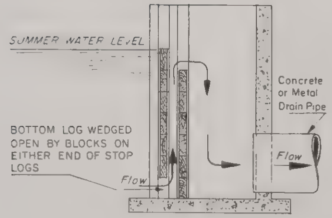
# RECOMMENDED DESIGN OF DAM ON A TROUT STREAM

PLAN OF DAMSITE

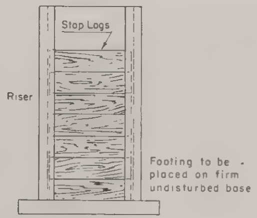



PROFILE OF DAMSITE



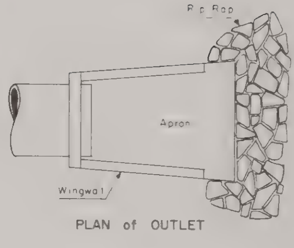




SECTION A – A

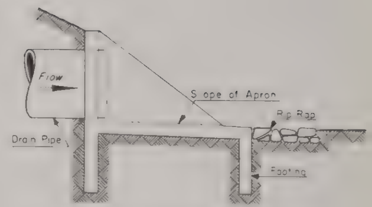



FRONT ELEVATION

DETAIL OF
REINFORCED CONCRETE – BOX TYPE INLET
WITH DOUBLE NOTCH FOR STOP LOGS

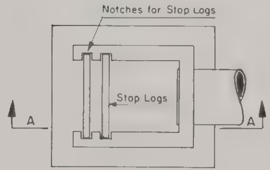



PLAN of OUTLET

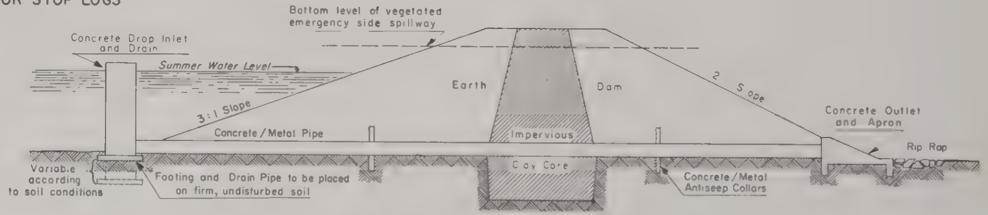



SIDE ELEVATION

DETAIL OF
CONCRETE OUTLET AND APRON




PLAN of INLET




SECTION THROUGH EARTH DAM

CONSERVATION AUTHORITIES BRANCH, Dep't E.& R.M., C.S.V. 1964

TABLE 1

SPECIES OF FISH

| Species | Number |
|---|---|
| Catostomus commersoni (White sucker) | 3,000+ |
| Salmo Gairdneri (Rainbow trout) | 24 |
| Notropis cornutus (Common shiner) | abundant |
| Semotilus atromaculatus (Creek chub) | abundant |
| Pimephales promelas (Fathead minnow) | occurs |
| Etheostoma nigrum (Johnny darter) | occurs |
| Cottus sp. (Sculpin) | occurs |

Stomachs of some of the larger suckers were taken, but their contents were unidentifiable. Ovaries of female suckers were nearly ripe, which may indicate that suckers spawn twice or more often during the breeding season, since normal spawning time for suckers is in May or June. (The pond was surveyed in late July.)

The following is a list of undesirable characteristics found for trout production and their probable origin.

(1) Algae

There is a thick layer of algae on the bottom of the pond. It has many effects on fish; it covers the natural habitat of invertebrates which are important as food, increases turbidity, and it may deplete oxygen during the winter, causing heavy winter mortality.

The high production of algae is due to excessive fertilization of the pond. This is probably caused by the herd of cattle which graze the shore of the pond and enter the pond to drink. A normal reflex causes cattle to leave droppings in the pond when their feet become wet; hence when they enter the pond they increase the fertility, which in turn increases algae and sets up a chain of events which favours the production of rough fish such as suckers and minnows, but inhibits the production of sport fish such as trout.

(2) Turbidity

Turbidity reduces light penetration and thus reduces the depth of active photosynthesis. Turbidity is caused by two main factors, (a) algae (b) suspended clay particles. The latter may interfere with fish breathing by clogging the gills.

(3) Silt

The bottom is heavily silted and this condition has destroyed the natural habitat required for invertebrates, the main source of trout food.

(4) Temperature

The western section of the pond is unsuitable for trout production, but it is ideal for coarse fish and algae production. Suckers may be produced in this area and then later invade the deeper sections of the pond. The temperature in this section is ideal for high minnow and sucker production.

(5) Suckers

Table I shows the ratio of suckers to trout. It is quite evident that there is in this pond an over-production of suckers which in high populations compete with trout. McCrimmon and Berst (1961) stated that it is suspected that the conversion of nutrients to sucker growth may be a factor related to the slow growth of trout.

(d) Discussion and Recommendations

The study of the pond indicated that it has a good potential for trout production if its conditions are improved. The following is a list of recommendations to increase trout production:

(1) The pond should be fenced to prevent cattle from entering the water.

(2) The suckers must be controlled or removed. Two methods could be used:

(i) One is to draw the pond down to a low level and then poison all the fish. This method does not seem feasible since a stream runs through the pond.

(ii) A complete draw-down of the pond, which would be allowed to remain dry for two to three weeks except for the small stream passing through it.

Both of the above methods will destroy the total fish population and restocking would be necessary.

(3) Algae control - Johnson (1960)* outlines the most effective means of controlling it.

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* Johnson, M.G. Field Experiments on the Use of Algicides in Ponds, (1960). A copy of his paper could be obtained from the Metropolitan Toronto and Region Conservation Authority, Box 720, Woodbridge, Ontario.

(4) Recuction of the surface area of the pond. The western section of the pond is contributing very little to trout production. If it has some effect it has a negative effect on trout production under the present arrangement.

McCrimmon (1960) states that a surface area of ¼ to 2 acres is the optimum size. (Larger ponds often present serious complications from the standpoint of aquatic weeds and coarse fish control.)

There are two proposed methods of eliminating the western section:

(i) The island can be used as a dike and continued to each shore.

(ii) The level of the pond can be reduced and the western section therefore dried up. The pond could then be mechanically deepened in the deep section to provide suitable water depth for trout. The depth at which the water leaves the pond can be easily made to remain three feet below the surface of the pond. If this method is used, shade species should be planted along the bank of the stream above the pond to prevent the stream from becoming too warm before it enters the pond.

4. Stocking of Streams

It is the practice of the Department of Lands and Forests to stock only streams which are not posted. It is recommended that the Authority urge the limiting of brook trout stocking to those waters which are shown in this survey to be suitable for brook trout, and which can be proved to have present populations below the carrying capacity of the stream. The only exception to this should be the occasional stocking of marginal or submarginal streams in the spring when the water is cold, with fish of good size, if the pressure of public fishing warrants this procedure and on the assumption that these streams will be fished out before the fish are destroyed by the higher water temperatures in the summer.

## Literature Cited


Johnson, M. G. (1960) Field Experiments on the Use of Algicides in Ponds.

McCrimmon, H.R. and Berst, A.H. (1961) The Native Fish Population and Trout Harvesting in an Ontario Farm Pond. The Progressive Fish Culturist.

McCrimmon, H.R. (1961) A review of Farm Trout Ponds in Southern Ontario. The Canadian Fish Culturist, November 29, 1961.

An area of the Mad River above the road south of Singhampton. The river is choked with vegetation making fishing extremely difficult. Below this point springs flow into the river and make it an adequate trout stream.

An excellent section of natural trout stream, deep and with adequate cover in Willow Creek. Access at a few scattered points would be helpful to the angler. This section is in Vespra Township.

## CHAPTER 7

## STREAM IMPROVEMENTS FOR FISH

Tarzwell* explains that the environmental requirements of fishes may be classed as:

(a) a favourable water supply,

(b) suitable spawning facilities,

(c) an adequate food supply for all age groups,

(d) good pools and shelter.

Studies in numerous places on this continent have already shown that the availability of suitable cover and feeding sites are dominant factors in delimiting the standing crops of older trout (age 1 and older). Assessment of the populations before and after treatment of streams by Saunders and Smith in Canada†, and by electrical shockers used by workers in Wisconsin, Michigan, and New York State, have left no doubt that various devices can create new habitats for both fingerlings (age 0) and older trout in what were formerly barren sections of a stream.

The number of eroded banks which may be noticed both on the tributaries and on the main stream of the Nottawasaga River also indicate the desirability of stream bank protection measures. Where large stones are plentiful, they can be used effectively to prevent erosion by dropping them down the bank of a stream with the aid of a front-end loader, and if necessary they can be arranged in place by hand.

### 1. Vegetative Measures

Vegetative soil protection should play the major role along the stretches of the streams near their sources. The following species of shrubs can be used:

Purple-osier Willow
Silky Dogwood
Red-osier Dogwood

These species contribute valuable wildlife habitat for upland game and songbirds and add aesthetically to the rural landscape. In addition the following crop species should be used:

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* Tarzwell, C.M. Water Quality Criteria for Aquatic Life. Published by United States Public Health Service, 1957.

† Saunders, J.W. and Smith, M.W. Physical Alterations of Stream Habitat to Improve Trout Production. Fisheries Research Board of Canada, St. Andrews, New Brunswick, 1960.

Reed Canary Grass
Red Fescue
Birdsfoot Trefoil

The Fescue-Trefoil mixture has been used successfully by many agencies, but the species most commonly used on stream banks is Reed Canary Grass. As the individual areas involved are usually small, broadcasting by hand and raking in with an ordinary garden rake are a practical way of doing this work. Where grazing is practised, any revegetation work will usually require complete protection. To accomplish this the fencing of long narrow strips of bottomland and the stream course has been demonstrated to be very effective. The installation of water-gaps is necessary to provide watering places for livestock. Where this is done the stream bottom should be covered with small stones or gravel. Stream bottom fences are not only beneficial in aiding the establishment of streamside vegetation, but also protect the existing vegetation and may often be justified on this basis alone. Probably no one factor alone contributes more in keeping silt from streams than the protection of streamside vegetation.

2. Structural Devices

Structural devices for stream habitat improvement are of three kinds. These include small dams, deflectors and bank cover producers, along with combinations of the last two systems.

Small dams can certainly be of value in very shallow streams. They may be made of large rocks backed by a seal of gravel and clay, or they may be made of any available wood such as large smooth logs, old railroad ties or, better, old squared timbers from former houses or bridges. In rock dams only large oblong rocks should be used in the main course, and they should be placed with the longest axis parallel with the direction of flow. The only points that must be stressed in log dams are that a gravel and mud seal is absolutely essential and that the logs must be well keyed into the bank. The lowest log should be placed flush with the bottom of the stream and the logs should be spiked together. Small dams have a tendency to silting above the dams and they are not illustrated here. Their best effect seems in fact to be the pools created by the erosive action of the water which pours over them. Boards instead of gravel seals are sometimes used, with green rough lumber at least two inches thick. It is good practice to avoid the use of poplar and related species because they lack strength when wet.

Deflectors were formerly used primarily for three purposes: (1) to scour pools by constricting the channel, thus increasing the cutting power of the

SINGLE-WING DEFLECTOR

Location of

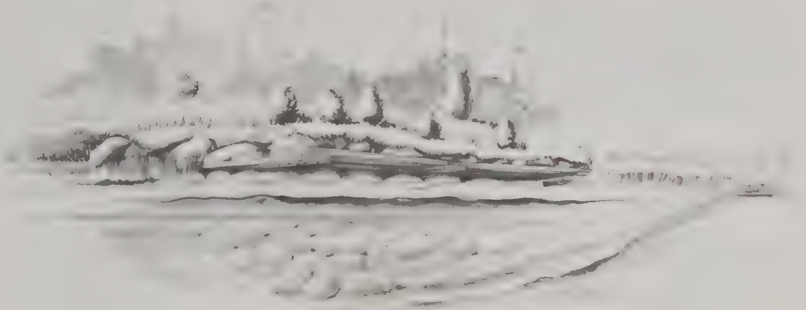
## Bank Cover Improvement Devices


FORMER METHOD

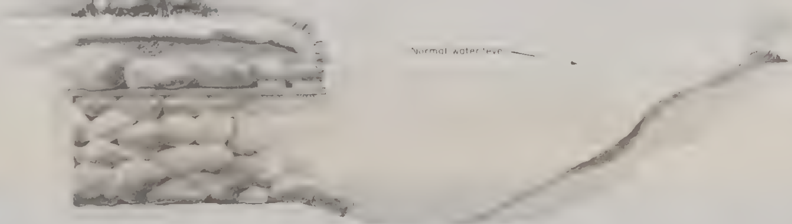


NEW METHOD

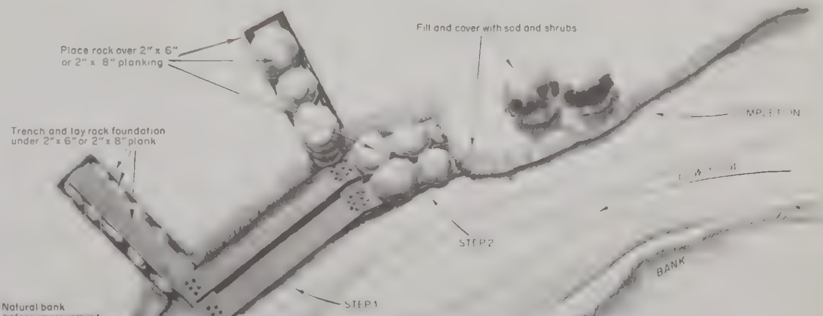

L. & F., Conservation Authorities Branch, R.W., 1963.



PERSPECTIVE VIEW AT EXTREME LOW WATER




SECTION VIEW




PLAN VIEW

WISCONSIN FISH COVER STRUCTURE

STREAM IMPROVEMENT WITH GABIONS

Poor stream improvement on a tributary of the Nottawasaga in Mono Township. Widening of the stream has left it shallow, warm and lacking in cover.

Much effort to little purpose on a trout stream one mile east of Glencross. Bank control has been carried out but the stream remains unsatisfactory for trout, with a noticeable lack of cover. The above photographs should be compared with the type of successful improvement shown on the accompanying pages.

streamflow; (2) to protect eroding banks; and (3) to cut off undesirable side channels.

It has been the common practice in stream improvements to place bank control devices or single wing deflectors on the outside of a bend of a stream so as to deflect water away from the point where erosion was likely to take place. An example of such a device is the single wing deflector shown on the accompanying sketch. This provides a pool at the outer end of the logs. The method of construction can easily be seen from the illustration.

More recently a new system has been used with great success. Here the deflectors are deliberately placed on the upstream side of the inside of a bend, as illustrated in the accompanying drawing, "Location of Bank Cover Devices". These deflectors increase the flow towards a cover device which is illustrated on a separate page over the title "Wisconsin Fish Cover Structure". In order to simplify the drawing, the fencing of stream banks, which is an integral part of stream improvement methods, has not been shown in any of the drawings of improvement devices. It has been found that the fish cover device shown appears from above, very soon after installation, like an ordinary stretch of well vegetated stream bank, but since the planks are below the normal stream level there is very little tendency for them to rot, and the structure can be expected to retain its usefulness for a long period. Large numbers of these devices are installed in streams in Wisconsin, and they are considered to be the best method of stream improvement in that State. It will be noted in the section view that rocks or large stones are first placed in the stream and allowed to assume a natural "angle of repose" before the planking is put in place, under water, and additional stones, sod and shrubs added above the water level.

Another system of stream improvement is that making use of gabions or wire baskets filled with stones. They may be used either to prevent bank erosion or to cause a large hole to be formed in the stream bed, as shown in an accompanying illustration. In the illustration, four gabions are shown as they appear in their actual location on one of the streams in the Metropolitan Toronto and Region Conservation Authority's Palgrave Conservation Area. Some care is required in filling the cribs; rocks are placed in the crib by building up the sides first and then filling in the centre.

Because of their artificial appearance, gabions may detract from the natural appearance of the stream. Therefore, their use should be limited to sites

where they will eventually be screened by protecting vegetation, or to sites where desired channel changes do not require a permanent structure. In some cases rock-filled log cribs may be preferable.

The Authority might well improve at least one stretch of publicly owned stream as an example to private owners.

## CHAPTER 8

## IMPROVING THE LAND FOR WILDLIFE

Landowners differ greatly in what species of wildlife they wish to have on their land. It is probably a safe assumption that about 50 per cent of the landowners in the Nottawasaga Valley are not interested in increasing the numbers and kinds of game species on their property. This, of course, still leaves a very large number who are interested. In this area the landowners also differ widely in their views on the subject of public hunting. There is certainly a higher percentage of landowners in the part of the watershed closest to Toronto who post their land or object to public hunting, than in the more northern sector of Southern Ontario.

There is also a steadily increasing interest in natural history in the region. However, in the region as a whole, organized and unorganized hunters and fishermen greatly outnumber the naturalists.

A Conservation Authority stands to gain little, if anything, monetarily from producing more game and fur, but the economy of the region is thereby enriched, and the improvement of lands for wildlife should be promoted and encouraged by every Conservation Authority as a means of increasing the multiple use of its lands for as many people as possible.

The Ring-necked Pheasant, one of the most important game birds in Ontario, is of little importance in this region. A small part of the southern end of Dufferin County is listed as marginal range for pheasants in the 1946 report compiled by Clarke and Braffette.* It may be worth noting that if there were any pheasants in the region in 1959 apart from those fed by residents, they were almost certainly destroyed by the exceptional ice storm of December 26-28, 1959†. This storm was described as the most heavily damaging glaze storm ever reported in Southern Ontario.

The chief species hunted in this region are now deer, ruffed grouse, European hares, varying hares, cottontails, red foxes, raccoons, and red and black (or grey) squirrels.

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* Clarke, C.H.D. and Braffette, R. Ring-necked Pheasant Investigations in Ontario, 1946. Department of Lands and Forests, Ontario, Miscellaneous Publications, 1947.

† Thomas, M.K. Glaze Storm of December 26-28, 1959. Report of Meteorological Branch, Department of Transport, Canada, 1960.

Mention must here be made of the damaging effects on fruit crops by certain birds. The depredations by starlings, redwinged blackbirds, cowbirds and grackles on raspberries in particular are so great, in the fruit-growing area south of Collingwood, that many noise-making devices are used throughout this area in an effort to frighten the birds away.

1. Woodlands

There are more than 50,000 acres of grazed woodlots in the watershed. The elimination of over-grazing in these woodlots would be the most useful single measure in improving the wildlife environment. There is one exception to this statement. Light grazing of the edge of a woodlot which has a good, rich and preferably damp soil may make the area very attractive to woodcock.

In young plantations on grassy land the entire planted area is valuable for wildlife. But large blocks of coniferous trees will, at least after about the twelfth year from planting, have little or no undergrowth and will, apart from edges or fire-breaks in them, be relatively sterile as far as upland game and most forms of wildlife are concerned. The chief improvements to be expected will, therefore, come from good management of the farm woodlot. In mixed woodlands selective cutting is both sound forestry practice and good for wildlife. Landowners who have woodlots in which the crown canopy has closed over considerable areas and who wish to produce a proper environment for wildlife, will find that release cuttings, slashings to stimulate sprout growth, thinnings and felling timber for sale will improve rather than reduce the carrying capacity for wildlife. Construction of brush piles from cuttings is recommended where cottontail rabbits are desired, two or three such brush piles per acre being the normal spacing.

2. Cultivation Practices

All good farming practices which make a more luxuriant vegetation will improve the farm environment for wildlife. A few special practices will give more specific benefits. Strip-cropping is of particular value, since by this means no extensive area is denuded of cover at one time by harvesting. Grassed waterways provide travel lanes and nesting cover for wildlife. Cover crops such as Hairy Vetch provide a habitat and food for wildlife in areas that would otherwise be barren during the winter months. The elimination of brushy fencerows is now becoming common in the Nottawasaga Valley, particularly in the area south of Collingwood, where there are many apple orchards. Those who are interested in

wildlife improvement will find that the inclusion of a few field boundary hedges on the farm will moderate the effect of winds on crops, serve as travel lanes and cover for wildlife and harbour large numbers of song birds which may help to control insect pests. Inevitably the presence of boundary hedges on a farm tends to encourage the growth of weeds. This is the price that must be paid for improved wildlife conditions in farmland.

The following are a few species of plants which are of particular value as food or cover for wildlife:-

Rosa multiflora - This is an excellent hedge-forming shrub. It has a tendency in Southern Ontario to die back in winter, but rapidly forms a dense hedge which is reported to be proof against cattle and hogs. It provides both cover and food and does not exhaust the nearby cultivated ground. The hardiness of some varieties is questionable. It might therefore be wise to propagate this species by vegetative means from individual plants that have already been planted and found to be hardy in the Nottawasaga area. Information on this species can probably be obtained from the Provincial Forest Nursery at Midhurst.

Hairy Vetch - This species can be grown on poor sandy soils, but it probaby would not do well on the poorest sandy soils of Mulmur Township and the adjacent area. Naturally it will grow better on good soils. This species over-winters well. Cottontails and the European hare use it for food and cover. The seeds are eaten by a great many of the ground-feeding birds.

Corn - A few rows of uncut corn standing in a field or garden will provide excellent cover and a continual supply of food for the larger birds. Cracked corn is useful for smaller birds. Corn left near streams will almost certainly be removed and eaten by raccoons, and is often taken before it is ripe.

Buckwheat - This common crop plant is chiefly grown for its abundant seed which is mixed in with other seeds in feed mixtures. The seeds have a high fat content. The rest of the plant is commonly ploughed under, particularly to increase the soil nitrogen. Much of the seed drops off in the stubble, and buckwheat stubble is a favorite feeding ground for almost all birds.

Highbush Cranberry - This shrub is strongly recommended and is a native species in this area.

European Millet - The abundance of seeds of this species attracts vast numbers of birds. The species requires a fertile soil. It is grown commercially for bird seed.

Wild Grape - Provides excellent wildlife food and cover, but it forms such a dense tangle over fences and young trees that it should only be planted where it can be carefully watched and controlled.

The Highbush Cranberry and Wild Grape can usually be found growing on some part of every farm.

There are many other plants that could be recommended for use as cover, food or nesting sites. Some of these are also useful for erosion control. Experiments are being carried out with a large number of shrubs in the Metropolitan Toronto and Region Conservation Authority's nursery and in experimental plots associated with this nursery. Silky Dogwood (Cornus Amomum) appears to be one of the most promising of these.

There has been an alarming increase in the destruction of roadside vegetation by poisonous compounds, and it appears that in some cases this has not been justified. It is recommended that the Authority recommend the restriction of the poisoning of roadside vegetation to those areas where it is absolutely necessary. In some sections of the valley the roadside vegetation provides the only good wildlife cover.

3. Water

The importance of water to wildlife is often forgotten. Many farms have at least one low spot where a small amount of work with a scoop will create a dam and a pond to provide nesting and feeding sites for water and marsh birds. If possible, ponds for wildlife should be separate from those intended for cattle or for fish. New water areas are usually very rapidly invaded by aquatic plants, but additional species may have to be introduced. No extensive duck food studies have been made in Southern Ontario. Wild Rice may be introduced but it cannot be considered as certain to succeed. The seed must be kept wet from the time it is harvested until it is sown (or broadcast) on the water surface. The idea has long been current, and fostered by many sportsmen's organizations, that the growing of Wild Rice is the answer to the problem of how to attract ducks to any area. It is a very important species where migratory wildfowl are wanted but it does not provide good cover or nesting sites in Ontario.

The following species which may be easily obtained are recommended as certain to be valuable duck foods. If none of them occur in ponds or shallows with good cover for ducks, they can be introduced. All of them are hardy in Southern Ontario.

| | |
|---|---|
| Sago Pondweed | Potamogeton pectinatus L. |
| Red-head Pondweed | Potamogeton Richardsonii (Ar. Benn.) Rydb. |
| Wild Millet | Echinochloa crusgalli (L) Beauv. |
| Japanese Millet | Echinochloa frumentacea (Roxb.) Link |
| Wild Celery | Vallisneria americana Michx. |
| Knotweed | Polygonum pensylvanicum L. |
| Water Smartweed | Polygonum coccineum Muhl. |
| Three-square | Scirpus americanus Pers. |
| Great Bulrush | Scirpus validus Vahl., var. creber Fern |
| Duckweed | Spirodela sp. and Lemna sp. |

Of the above species the most useful are Sago Pondweed, Wild Celery and Knotweed. Wild Celery grows best on a firm but fertile bottom in from 3½ to 6½ feet of water. A sluggish current suits it better than either stagnant or rapid water. It is not known to grow in alkaline water.

Those who are interested in farm ponds for wildlife or for warm water species of fish will find very useful details of the various types of ponds and methods for constructing them in the booklet "Farm Ponds", published by the Provincial Department of Agriculture. It is frequently good practice to have separate ponds devoted to wildlife and fish and to control the aquatic plants in a fish pond.

In managing warm water ponds for fish the following points should be kept in mind.

(a) A minimum depth of 12 feet over at least 25 per cent of the pond should be planned to avoid excessive winter kill, probably the critical factor in fish survival in farm ponds in Ontario.

(b) If suckers, carp or large numbers of minnows are already present in the pond, it is usually best to destroy all fish in the pond before stocking.

(c) Since many of the species commonly recommended for introduction grow very slowly in Ontario waters, research to determine the most satisfactory species will be needed. New ponds and those in which the previous fish have been destroyed might be stocked experimentally with a combination of largemouth bass and either the fathead minnow or the golden shiner, both of which occur in the watershed.

The fertilizing of ponds for the increased growth of plankton (the smaller aquatic invertebrates) to provide food for fish should be approached with caution. Those considering fertilizing ponds should apply to the local District Biologist at Hespeler or Maple for advice.

Aquatic plants have various effects in ponds. They provide cover for the young of every species, and they may be essential for the spawning of some species. In low densities they may encourage the development of invertebrate foods for fish. A blanket of Muskgrass, Chara sp., (one of the algae) over most of a pond bottom may maintain an important cool habitat in the water in hot weather. However, the merits of aquatic vegetation may be overshadowed by more important disadvantages. Little or no photosynthesis takes place beneath a layer of ice or snow. Plant decay will reduce the oxygen content of the water and this, with the resultant liberation of carbon dioxide, ammonia and hydrogen sulphide, may kill all or part of the fish population. If there is a partial kill, it is the game fish which will suffer most since they have higher water quality requirements.

Relatively shallow ponds are more susceptible to invasion by plants, and to remain suitable they should be kept reasonably free of weeds. The presence of higher aquatic plants in large quantities significantly decreases production of phyto and rotifer plankton.* The basis of a modern fish management program is adequate production of plankton and bottom fauna, with proper control of algae and the submersed and emergent plants.

## 4. Control of Aquatic Plants in Ponds

Considerable research has been carried out by the Ontario Water Resources Commission in the control of algae, particularly Cladophora, in Ontario. The Metropolitan Toronto and Region Conservation Authority has also carried out extensive research in the control of algae, the flowering submersed vegetation and emergent vegetation.

Blooms of algae on the surface of ponds are not usually a problem in Ontario. Algae in ponds are often only present for a short time and will disappear in a month or so. It is recommended that the safest method of getting rid of algae is to treat the pond with a concentration of one part per million of copper sulphate, which should be distributed uniformly over the pond. If there is no sign of disintegration or change in colour of the algae, then a second dosage of one part per million should be given in three or four days, and if this is not successful a third dosage should be given of the same concentration three of four days later. Under no circumstances should three parts per million of copper

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* Hasler, E.D. and Jones, E. Demonstration of antagonism of large aquatic plants on algae and rotifers. Ecology, 30 (3), 1949.

sulphate be applied in a single application. There are several other chemical compounds on the market which are recommended by the makers as suitable for destroying particular species of algae.

The control of other submersed vegetation is a more difficult problem. A few years ago there were very few aquatic herbicides available. The most frequently used of these was sodium arsenite, which is very effective and economical, but its use requires great care and it is dangerous from the point of view of public health. This compound should now be replaced by one of the new and safer herbicides. Endothal, Silvix, Fenac, 2-4-D, Diquat, Paraquat, Simazine and Atrazine provide a wide selection for control of most submersed weeds in farm ponds. New compounds are now appearing for sale almost every month.

Of the emergent vegetation, Cattails and most other species can be killed with Dalapon at rates of 10-15 pounds per acre.

It should be remembered that if there is any plan to treat aquatic vegetation with a chemical herbicide it would be absolutely necessary to receive a permit from the Ontario Water Resources Commission, if the treated water flows into any other privately owned or public waters.

If there is doubt as to what the species of weeds are and how they may be controlled, a fair sample of the weeds should be placed in a quart sealer which contains a 5 per cent solution of formaldehyde, and the sealer should be sent to the Ontario Water Resources Commission, Toronto. The Ontario Water Resources Commission can provide information as to where the recommended products can be obtained in Ontario.

## CHAPTER 9

## NATURAL HISTORY AND THE MINESING SWAMP

### 1. Natural History in the Nottawasaga Valley

The rapidly growing interest in natural history in Ontario is well known. Three factors have contributed greatly to the interest in the fauna and flora of the region. One of these is the presence of much spectacular country and relatively wild conditions along the cliffs and hills of the escarpment, and the presence of a considerable stretch of the shore of Georgian Bay, virtually deserted by humans during the spring and fall bird migrations. A second factor is the presence of the Minesing Swamp, supplying unusual conditions for both animal and plant life in this region. The third factor is the leadership of various persons, particularly L.H. Beamer of Meaford, A.J. Mitchener of Collingwood, and O.E. Devitt, who has spent much of his life in the Nottawasaga Valley.

No attempt was made to make a systematic list of the mammals of the region, but such a list would probably include, besides the 21 common species observed during the survey, some five species of bats which are chiefly nocturnal, and many other small and seldom seen species such as the water shrew. Incidentally, the brush wolf was not seen during the survey, but it has been frequently reported from the area and is doubtless present at least at intervals.

The following list of birds includes 269 species which are known to have occurred in comparatively recent times in the area under the jurisdiction of the Conservation Authority. There is excellent evidence that the Wild Turkey was formerly resident in Nottawasaga Township, but it is excluded from the list. The Passenger Pigeon is also omitted from the list as the species is now extinct. The spectacular flights of millions of the Passenger Pigeon migrating together astounded the early settlers. The following two excerpts are taken from the excellent report on the birds of this area by O.E. Devitt.*

> "The Passenger Pigeon was formerly an abundant breeding bird in the county (Simcoe). According to available records, it nested in the townships of Sunnidale, Innisfil, Essa, Vespra, Nottawasaga, Oro, West Gwillimbury and Flos. A history of this species in Ontario by Margaret H. Mitchell†

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* Devitt, O.E. The Birds of Simcoe County, Ontario. Transactions of the Royal Canadian Institute, Volume XXIV, Part 2, 1943; Volume XXV, Part 1, 1944.

† Mitchell, M.H., 1935. The Passenger Pigeon in Ontario. Contributions of the Royal Ontario Museum of Zoology, No. 7.

contains a number of references to breeding colonies in Simcoe County. Included is the statement of Mr. William Metcalf that 'in the year 1859 they nested in a large swamp (Minesing) between Allandale and Angus, the colony covering hundreds of acres'."

"Major Mark Robinson in conversation with the writer said that he remembered seeing great numbers of pigeons nesting in Norway pines, which used to cover the sandhills two miles south of Wasaga Beach about 1870. Between 1850-1880 the species seems to have experienced a steady decrease in numbers. The great flocks became a thing of the past and after 1880 only small groups were recorded -"

The last Passenger Pigeons reported in the area appear to have been seven seen near Wasaga Beach in 1887.

The Spruce Grouse is listed, as it was formerly a common bird of the Minesing Swamp and other coniferous woodland, but it does not appear to be resident in this area now. The Bobwhite apparently came in when the land was partly cleared, in the Collingwood-Wasaga Beach area. It was last reported about 1910 in the region. The Ring-necked Pheasant appears to remain only where it is fed in winter. The King Rail was last seen in 1896 in the area. The Cattle Egret is of course a newcomer from Africa.

Other rare birds of which there are fewer than three records are shown in the list, but recorded with a star* preceding the name. The whole list is reconstructed from those of O.E. Devitt (op. cit.) and A.J. Mitchener. Several species listed by Devitt in the Simcoe County list are omitted because they have only been observed in the Holland Marsh or other parts of the county outside the region under consideration.

One hundred and twenty three species are known to breed in the area, and where there is such evidence the name of the bird is followed by - N.

The arrangement and the names in the list are from the American Ornithologists' Union Check-List (5th edition, 1957).

## BIRDS OF THE NOTTAWASAGA VALLEY

Common Loon - N
Red-throated Loon
Red-necked Grebe
Horned Grebe
Pied-billed Grebe - N
Double-crested Cormorant
Great Blue Heron - N
Green Heron - N
*Common Egret
*Cattle Egret
Black-crowned Heron
Least Bittern - N
American Bittern - N
*Glossy Ibis
Whistling Swan
Canada Goose
Brant
Snow Goose
Blue Goose
Mallard - N
Black Duck - N
Pintail
Green-winged Teal
Blue-winged Teal - N
*European Widgeon
Shoveler
Wood Duck
Redhead
Ring-necked Duck
Canvasback
Greater Scaup
Lesser Scaup

Common Goldeneye
Bufflehead
Oldsquaw
*Harlequin Duck
*King Eider
White-winged Scoter
*Surf Scoter
Common Scoter
Ruddy Duck
Hooded Merganser - N
Common Merganser
Red-breasted Merganser
Turkey Vulture - N
Goshawk
Sharp-shinned Hawk - N
Cooper's Hawk
Red-tailed Hawk - N
Red-shouldered Hawk - N
Broad-winged Hawk - N
Swainson's Hawk
Rough-legged Hawk
Bald Eagle - N
Marsh Hawk - N
Osprey
*Gyrfalcon
Peregrine Falcon
Pigeon Hawk
Sparrow Hawk
*Spruce Grouse
Ruffed Grouse - N
Bobwhite
Ring-necked Pheasant - N
Gray Partridge
*King Rail
Virginia Rail - N
Sora - N
Common Gallinule - N
American Coot - N
Semipalmated Plover
Piping Plover
Killdeer - N
American Golden Plover
Black-bellied Plover
Ruddy Turnstone
American Woodcock - N
Common Snipe - N
Whimbrel
Upland Plover - N
Spotted Sandpiper - N
Solitary Sandpiper
*Willet
Greater Yellowlegs
Lesser Yellowlegs
Knot
Purple Sandpiper
Pectoral Sandpiper
White-rumped Sandpiper
Baird's Sandpiper
Least Sandpiper
Dunlin
Short-billed Dowitcher
*Stilt Sandpiper
Semipalmated Sandpiper
*Western Sandpiper
*Buff-breasted Sandpiper
*Marbled Godwit
Sanderling
*Red Phalarope
Wilson's Phalarope
Northern Phalarope
Parasitic Jaeger
*Pomarine Jaeger
Glaucous Gull
*Iceland Gull
Great Black-backed Gull
Herring Gull - N
Ring-billed Gull - N
*Franklin's Gull
Bonaparte's Gull
*Forster's Tern
Common Tern - N
Caspian Tern
Black Tern - N
Rock Dove - N
Mourning Dove - N
Yellow-billed Cuckoo - N
Black-billed Cuckoo - N
Screech Owl - N
Great Horned Owl - N
Snowy Owl
Hawk-Owl
Barred Owl
Great Gray Owl
Long-eared Owl - N
Short-eared Owl
*Boreal Owl
Saw-whet Owl
Whip-poor-will - N
Common Nighthawk - N
Chimney Swift - N
Ruby-throated Hummingbird - N
Belted Kingfisher - N
Yellow-shafted Flicker - N
Pileated Woodpecker - N
Red-headed Woodpecker - N
Yellow-bellied Sapsucker - N
Hairy Woodpecker - N
Downy Woodpecker - N
Black-backed Three-toed Woodpecker
Northern Three-toed Woodpecker
Eastern Kingbird - N
Great Crested Flycatcher - N
Eastern Phoebe - N
Yellow-bellied Flycatcher
Traill's Flycatcher - N
Least Flycatcher - N
Eastern Wood Pewee - N
Olive-sided Flycatcher
Horned Lark - N
Tree Swallow - N
Bank Swallow - N
Rough-winged Swallow - N
Barn Swallow - N
Cliff Swallow - N
Purple Martin - N
Gray Jay
Blue Jay - N
*Raven
Common Crow - N
Black-capped Chickadee - N
Boreal Chickadee
White-breasted Nuthatch - N
Red-breasted Nuthatch - N
Brown Creeper
House Wren - N
Winter Wren
Carolina Wren
Long-billed Marsh Wren - N
Short-billed Marsh Wren - N
*Mockingbird

Catbird - N
Brown Thrasher - N
Robin - N
Wood Thrush - N
Hermit Thrush - N
Swainson's Thrush
Gray-cheeked Thrush
Veery - N
Eastern Bluebird - N
Blue-gray Gnatcatcher
Golden-crowned Kinglet - N
Ruby-crowned Kinglet
Water Pipit
Bohemian Waxwing
Cedar Waxwing - N
Northern Shrike
Loggerhead Shrike - N
Starling - N
White-eyed Vireo
Yellow-throated Vireo
Solitary Vireo
Red-eyed Vireo - N
Philadelphia Vireo
Warbling Vireo - N
Black-and-white Warbler - N
Golden-winged Warbler
Tennessee Warbler
Orange-crowned Warbler
Nashville Warbler - N
Parula Warbler
Yellow Warbler - N
Magnolia Warbler - N
Cape May Warbler
Black-throated Blue Warbler - N
Myrtle Warbler - N
Black-throated Gray Warbler
Black-throated Green Warbler - N
*Cerulean Warbler
Blackburnian Warbler - N
Chestnut-sided Warbler - N
Bay-breasted Warbler
Blackpoll Warbler
Pine Warbler - N
Prairie Warbler - N
Palm Warbler
Ovenbird - N
Northern Waterthrush - N
Connecticut Warbler
Mourning Warbler - N
Yellowthroat - N
Hooded Warbler
Wilson's Warbler
Canada Warbler - N
American Redstart - N
House Sparrow - N
Bobolink - N
Eastern Meadowlark - N
*Western Meadowlark
Redwinged Blackbird - N
Baltimore Oriole - N
Rusty Blackbird
Common Grackle - N
Brown-headed Cowbird - N
Scarlet Tanager - N
*Summer Tanager
Cardinal - N
Rose-breasted Grosbeak - N
Indigo Bunting - N
Evening Grosbeak
Purple Finch - N
Pine Grosbeak
Hoary Redpoll
Common Redpoll
Pine Siskin
American Goldfinch - N
Red Crossbill
White-winged Crossbill
Rufous-sided Towhee - N
Savannah Sparrow - N
Grasshopper Sparrow
Henslow's Sparrow
Vesper Sparrow - N
Slate-colored Junco - N
Oregon Junco
Tree Sparrow
Chipping Sparrow - N
Clay-colored Sparrow
Field Sparrow - N
*Harris' Sparrow
White-crowned Sparrow
White-throated Sparrow - N
Fox Sparrow
Lincoln's Sparrow
Swamp Sparrow - N
Song Sparrow - N
Lapland Longspur
Snow Bunting

## 2. The Minesing Swamp

Interest in the flora of the region is chiefly centred in the Minesing Swamp, where a number of rare orchids and many other northern bog species of plants occur. The swamp extends over 13,000 acres, and is used by large numbers of waterfowl when it is flooded in the spring. A few ducks breed in the very limited suitable areas in the summer. The part of the swamp which is flooded in spring tends to be covered with dense dogwood, scrub willow and young soft maple where the larger trees, chiefly white cedar, are not too dense. There are several areas of tamarack swamp amongst the general vegetation of white cedar, and there is a small area of open bog. Beaver and muskrats occur in relatively small numbers,

The Minesing Swamp as seen from the road to the south-east of it. This swamp stretches over an area of some 13,000 acres.

The meandering section of the upper reaches of the Nottawasaga River is incised in a sand plain. This is below the area of brook trout water, and has few, if any, game fish in it; but it is used by rainbow trout in their seasonal spawning runs.

presumably because of the very deep flooding in the spring.

Rabbits and hares are not plentiful, also because of the spring flooding, but these species along with deer gradually enlarge their territory to include parts of the flooded area during the summer and fall, when the spring floods are gone. The number of deer present is not known but there is reported to be considerable illegal hunting of deer along the edges of the swamp. There was no open season on deer in 1963 in Simcoe County and it appears probable that any open season on deer will be by the option of individual townships, as there is considerable opposition from landowners, particularly in the southern part of the watershed.

It appears that the best management for this area is primarily as a natural water impoundment area and for the management of fish, game and other species of wildlife.

There are at least two large heronries in the Minesing Swamp. One of these lies between the two branches of Willow Creek where it separates into two parallel streams. The other one is in the centre of the swamp near the Nottawasaga River. The Authority might consider the possibility of acquiring at least one of these heronries.

A much more detailed description of the Minesing Swamp will be found in the Forestry section of this report.

# RECREATION

## CHAPTER 1

## INTRODUCTION

### 1. Population

Ontario is Canada's most populous province. According to the Municipal Directory, its population in 1963 was 6.04 million people, and the population has been rising continuously for a great many years. It is possible that the population may double in the next thirty years. This increase will of course be mainly in urban areas. The trend to urbanization is very pronounced in Peel and York Counties. Many thousands of people from Peel and York Counties now use parts of the Nottawasaga region for recreation and the watershed itself includes a very small part of Peel County.

The distribution of the rural population over the watershed is comparatively even, except for the Township of Essa, which is much more densely inhabited than the other townships, and the Township of Mulmur, which has large areas of abandoned land. The population is much affected by the presence of Camp Borden, which contains an estimated average of 14,000 persons. However, many of these are men on short and intensive courses, who have little free time and do not go far from the camp except to Barrie.

The chief urban population is of course centred around the expanding City of Barrie, of which a small part is in the watershed. Compared with Barrie, Collingwood's population is relatively stationary at 8,800.

The permanent population of Wasaga Beach is listed at little more than 400 but, on week-ends in the summer, estimates of the inflow range from 30,000 to 75,000. Mention must also be made of the population of the Hockley Valley, to which thousands of skiers go in winter, and of the Osler Bluffs private ski club, whose visitors do not appear as permanent residents. These people throng to this part of the watershed in Collingwood Township at week-ends in winter, but in general do not make other use of the recreation facilities of the watershed. Their chief effect in the economy of the watershed is their contribution to the building trades.

### 2. Recreational Needs

Greater mobility, shorter work weeks, longer holidays, higher wages and a general rise in the standard of living are bringing more recreational activity within the reach of more and more people. It is now obvious that the

tourist industry plays a very important part in the economy of the Nottawasaga region, and provision should be made for greater recreation facilities, not only for the use of the local people but also in the interest of the local economy.

It is clear that while the area for consideration has been limited to the Nottawasaga region, it would be unrealistic to place the same limits on the area from which recreation demand is likely to be felt. The demand likely to be focussed on the watershed is not simply an expression of its population alone, but rather that of Southern Ontario as a whole. Moreover, the pressure of demand from beyond the watershed may be expected to increase in direct proportion to the development of facilities within the area. The natural scenic advantages of the area make this demand more certain, since much of Southern Ontario lacks equally attractive sites to develop.

The residents of the region will, of course, spend part of their recreation time beyond its confines. There is no doubt, however, that the net outflow from the watershed is much less than the inflow, especially to the Georgian Bay shoreline. The inflow of recreation seekers may be broken down into two categories, the short-term resident and the commuter. Both of these, but more especially the former, constitute an important source of revenue to the favoured sections of the region. There are therefore two aspects to any plan for the development of recreation in the region. In terms of the local residents a service is provided and, in terms of visitors from beyond the area, an economic activity is initiated.

3. Development of Facilities

Two approaches are possible in the development of recreation facilities in an area. Firstly, sites may be established on the basis of location, in terms of distances from population centres and areas of greater population density within the region. Such sites may not be the most attractive, but they do offer facilities for simple recreational needs as is shown by municipal and community parks. Secondly, especially attractive sites may be selected, irrespective of their position in relation to local centres of population. It is such sites which, despite distance, may constitute an economic as well as a social enhancement to the watershed. This second approach has been adopted in this report. Areas of greater recreation potential are very unevenly distributed throughout the watershed and priority has been given to the acquisition of some of these while they still are available in a comparatively undeveloped state. The hope of


## POPULATION DENSITY

EACH DOT REPRESENTS 100 PEOPLE

SCALE : MILES

2 1 0 2 4 6 8 10

L&F CONSERVATION AUTHORITIES BRANCH T.L.L. 1963

attracting more tourists into the watershed has been of some importance in making this decision. Already many communities have small recreation centres, which may be considered as satisfactory for the less demanding local use.

No deliberate attempt has been made to locate proposed Conservation Areas so as to enhance existing cottage areas, both because of the exclusiveness of this type of recreation and because of the divergence of policy with regard to cottages among the different municipalities of the region.

## 4. Objectives of the Report

Within the Nottawasaga region, the zones of greater recreation potential will be delimited chiefly in terms of physical resources, and within these zones certain areas as yet undeveloped will be recommended for acquisition by the Conservation Authority. Since it is felt that the budget of the Conservation Authority is not sufficient to totally satisfy the demand for recreation facilities through purchase, steps to open up wider areas for "visual" recreation will also be recommended. Facilities already existing in Provincial Parks will not be duplicated unless the need for them is evident. It will be noted that several of the recommended areas lie within that section closest to Toronto. A population of 1½ million people situated so close to the region cannot be ignored when a part of this population can contribute to the improved economy of the region.

CHAPTER 2

## EXISTING RECREATIONAL DEVELOPMENT AND ZONES OF RECREATION POTENTIAL

The accompanying map (Existing Recreation Facilities) is not a comprehensive catalogue of all existing developments. It merely highlights the major areas of private and commercial development and the Provincial Parks. It will be noted immediately that the area has been subject to a great deal of development. This development has been of two kinds: "Producer", where natural facilities have been improved or developed, and "Consumer", for the enjoyment rather than the enhancement of existing facilities. That stage in the development of a recreation area has even been reached, in places, where consumer facilities are grouped in tiers around the resource to be tapped, the latecomers being dependent only upon avenues of general public access. This condition is of course most marked along the Georgian Bay shoreline, but is becoming noticeable also in the Hockley Valley, that portion of the Nottawasaga Valley which lies closest to Toronto.

The principal conclusion reached from a study of the existing recreation developments is that this survey, together with its recommendations, has come almost too late. Most of the very best locations have already been taken up. Moreover, while this advance of private and commercial development along the zones of greater recreation potential has made it vital that some part of these be secured for the use of the general public, it has also caused a tremendous increase in the price of land throughout the zones. One must also note the exclusiveness of this private development, blocking off the access of the general public, for example, to very large sections of the upper river valleys. One important aspect of recreation planning lies in the opening up, at least partially, of such areas to certain forms of public recreation.

The present commercial summer facilities are not, in general, of a very high quality. Thus, while certain kinds of amenity are available at reasonable cost to the public, none except the three Provincial Parks can be considered as satisfactory components in a general scheme for the recreational development of the watershed.

It is not proposed to recommend the acquisition of skiing slopes. The best of these are slopes facing north or east, and very large amounts of money have already been invested in them. Nowadays one or more ski-tows and a food concession

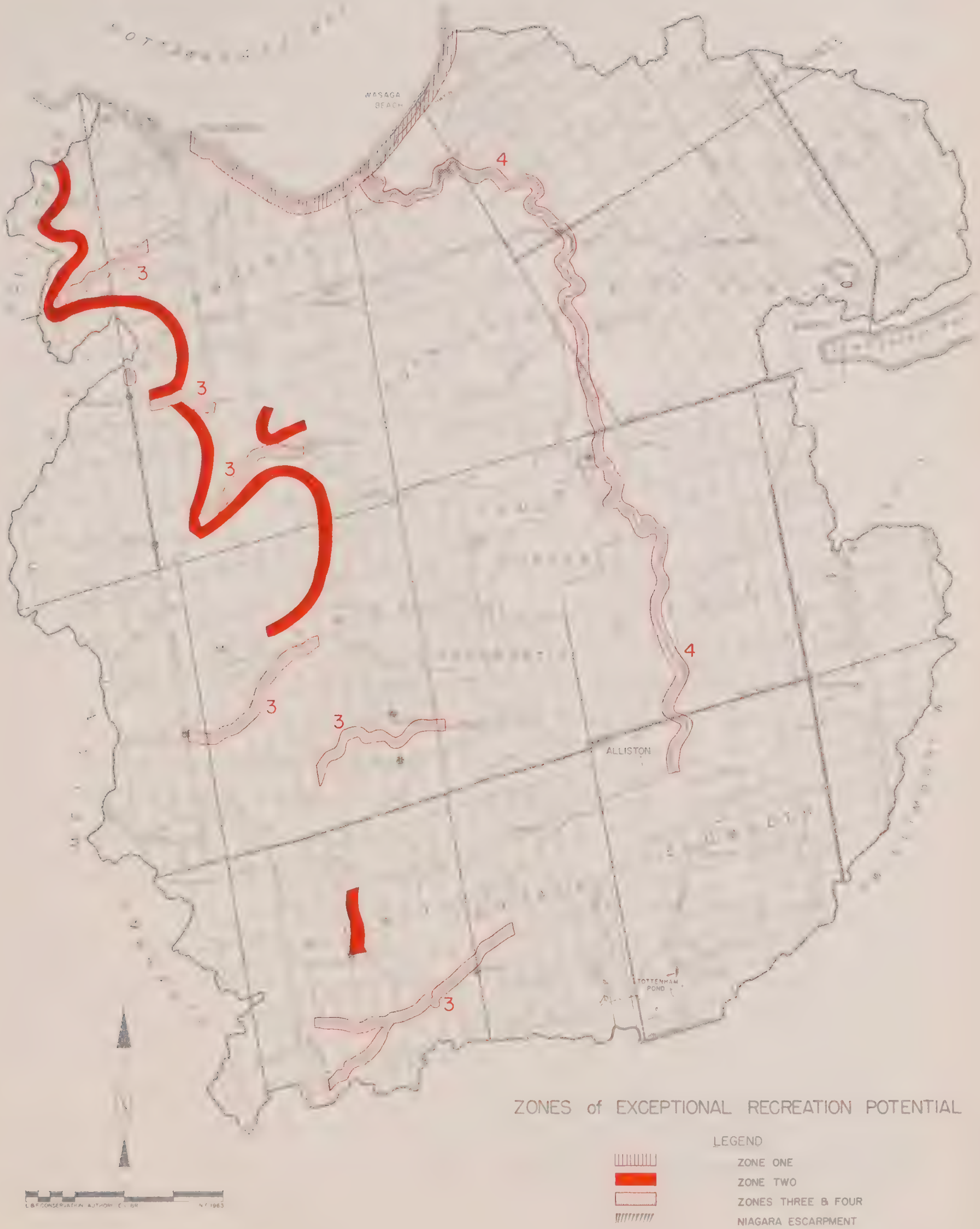
are virtually a necessity to make a paying proposition of a skiing area. Several very successful skiing areas are at present being operated. There are at least four on the north-facing slopes of the Hockley Valley. Another is situated close to the Devil's Glen Provincial Park. West of Collingwood there are at least four commercial skiing areas on the escarpment face, just outside the limits of the Nottawasaga region. A single private skiing club with a highly restricted membership lies on the edge of the Osler Bluff west of Collingwood and within the Nottawasaga region. There is also a skiing area south-west of Barrie. While skiing is a sport which is growing very rapidly, it does not appear to be a recreation activity in which the Authority should take a special interest.

The spread of private and commercial development for recreation in the Nottawasaga region is so wide that it is possible to judge from the areas now favoured by the public what features will make an attractive recreation area. From a study of the non-skiing developments in the region there are certain common characteristics which indicate the physical conditions which the public seeks for its recreation. In evaluating the recreation potential for this particular region, little consideration need be given to the Georgian Bay shoreline. Clearly, the attractions here are the beach and the water, and little prospect exists for the acquisition of such land. Elsewhere the existence of water, even if not in a sufficient quantity for swimming, is an almost universal characteristic. Those areas which have experienced most development are of broken, yet not precipitous, relief, with plenty of standing timber and, very often, attractive views.

It may be argued that recreation should encompass more than simply the enjoyment of certain physical resources. Certainly consideration should also be given to such factors as interest in natural history, local history, education, and hunting and fishing. In the field of education, it is felt that a reforestation area could be opened to the public, to demonstrate techniques of planting and erosion control, while also providing picnicking and possibly camping facilities. It may be noted that the Midhurst Forest Nursery already demonstrates forest nursery techniques to the public.

Before proceeding to the formulation of a plan for the recreational development of the watershed, it is necessary to examine briefly those recreation facilities which already exist and which are of a quality which merits their consideration in such a plan. These include the Provincial Parks already developed.


EXISTING RECREATION FACILITIES


WASAGA BEACH
ALLISTON
TOTTENHAM POND
ZONES of EXCEPTIONAL RECREATION POTENTIAL
LEGEND
ZONE ONE
ZONE TWO
ZONES THREE & FOUR
NIAGARA ESCARPMENT

The Earl Rowe Provincial Park, which occupied only 110 acres in 1962, has been expanded so that its area is now 742 acres. It lies along the flats of the lower course of the Boyne River. Its chief facilities include swimming, camping and picnicking. This park gives an illustration of the way in which the various parks in the Province are interrelated geographically. It has been expanded with the chief intention of diverting some of the overflow from the Sibbald's Point Provincial Park, which lies some distance away on Lake Simcoe and is far outside the region.

Springwater Provincial Park provides a very different type of facility in its various wildlife exhibits as well as less specialized attractions, such as picnicking, in its 116 acres. The Devil's Glen Park, however, (only 13 acres in area) provides little more than a very spectacular view of the attractive upper valley of the Mad River. The Wasaga Beach Provincial Park, which is now 7 miles long in an extremely narrow strip of beach, was set up to gain some control of the very difficult problems associated with the enormous popularity of the beach at weekends. Traffic control, beach patrol and sanitary facilities are provided in this park.

As a preliminary to the recommendation of specific areas for acquisition, an attempt will be made to delimit zones of greater than average recreation potential. For the puposes of this report the potential is measured in physical terms. It is not proposed to make divisions on the basis of physiography, unless, as in the case of the Niagara Escarpment, such units are unusually spectacular.

There are four broad types of terrain in the watershed which have physical features of greater than average recreation potential. These are shown on the accompanying map. The zone with the greatest potential, and therefore the zone most completely taken up, is the zone of lake frontage (No. 1 on the map), with the obvious characteristics of a very fine beach.

That zone within which the Silurian dolomite of the Niagara Escarpment emerges from its masking of glacial deposits is also considered to be of relatively great potential though, as yet, little developed. In this zone (No. 2), spectacular scenery constitutes the chief attraction but, in places, other facilities, such as swimming, can be developed.

A third zone (No. 3) lies along the upper courses of many of the rivers. Small streams flow swiftly through steep-sided, tree-clad valleys. While water is not available in large quantities, the varied terrain makes this zone very attractive.

One of the most important sections of this zone is the valley of the Pretty River. A very attractive winding road passes down the valley northward and eastward from the Village of Rob Roy in Collingwood Township, at an elevation of 1,575 feet, past farms and woodland to the lower slopes of the escarpment, some 700 feet lower down. Considerable portions of the valley slopes are already owned by non-residents.

The better drained portions of the lower course of the Nottawasaga, and parts of some of its major tributaries, constitute the final zone (Zone No. 4). Here some reduction in the variability of relief is compensated for by the increased size of the river, which makes the development of reasonably good swimming facilities possible. In addition, within this zone some exceptionally fine views are to be found.

It can now be seen that there already exist satisfactory areas within the lower river valley zone and the sandy country near Midhurst. More important than this, however, is the assurance of continued public access to a considerable portion of the Georgian Bay shoreline, which, although it has been developed in a very haphazard manner by private owners, is by far the most important recreation feature of the whole watershed.


PROPOSED

CONSERVATION AREAS

LEGEND

POSSIBLE ROUTE OF BRUCE TRAIL

CONSERVATION AREAS

SCALE MILES

L & F CONSERVATION AUTHORITIES BRANCH 1963 CSV

## CHAPTER 3

## A PLAN FOR THE RECREATIONAL DEVELOPMENT OF THE WATERSHED

It is considered essential that immediate steps be taken to secure land within the upper valley and escarpment zones, namely the Scott's Falls and Mono Caves areas. In addition, in view of the extremely limited number of good lower valley sites remaining undeveloped, it is recommended that the Essa Bluffs Area also be placed on the list for priority of purchase.

Once these sites have been secured, it is felt that the next step should lie in the publicizing of the best access routes to the zones of greater potential. Such routes would allow people to look at scenery without trespassing. In this respect, the watershed is fortunate in the number of valley roads which penetrate the area. There are already several routes which are paved and which will be maintained at no cost to the Authority, opening up several sections of the upper valley zone. A north-south foot path along the escarpment, sometimes above and sometimes below it, would open up a second zone, in addition to crossing many upper valley areas. The Authority is again fortunate in the opening up of the Bruce Trail at this time, although agreements have not yet been signed for most of this area. The general arrangement is that the owner retains full ownership of the land but allows the public to walk along the Bruce Trail, which is normally cleared of brush and vegetation to a width of about ten feet. It is intended that the Bruce Trail will provide a continuous walking path from the Niagara River to the north end of the Bruce Peninsula along the Niagara Escarpment, and several sections of the Trail are already under agreement and are being extensively used. Camping sites would not be normally available along the Trail except in a few areas, but even these areas would not be accessible by car. It is recommended that the Authority adopt a favourable and co-operative attitude towards development of the Trail, which has received great publicity in Ontario. Local committees are working now on the various sections of the Bruce Trail. The organization and the method of agreement with property owners is based on that used in the Appalachian Trail in the United States, which is more than 1,000 miles long and has been an unqualified success.

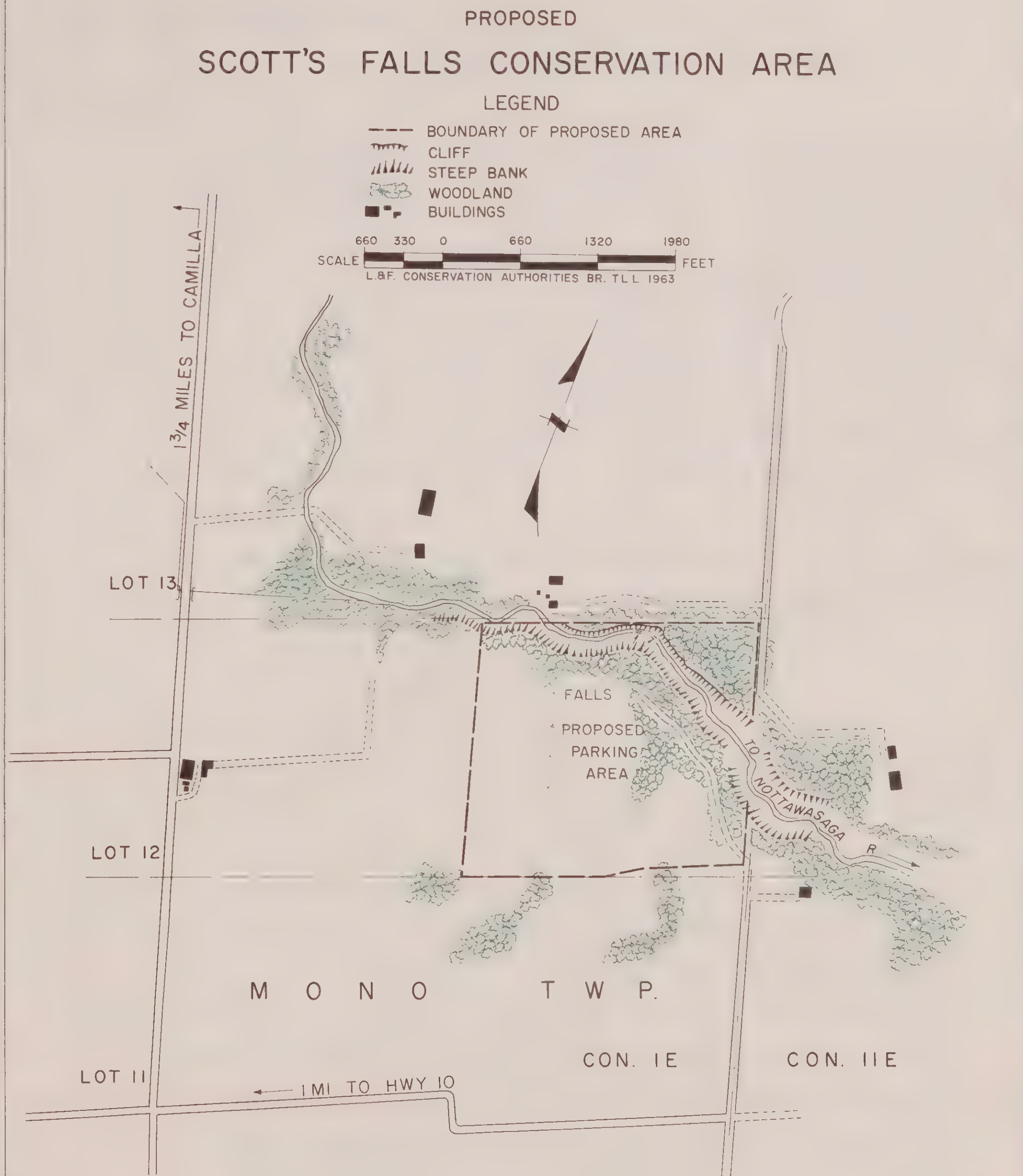
A route of another kind, passing through the northern portion of the lower valley zone, is feasible, namely along the Nottawasaga River itself. The river is navigable to canoes early in the summer from at least as far south as Angus, but when the flow becomes low there are four places at which passage is difficult

even for a canoe. Three of these are rapids close to the point at which the Nottawasaga River turns eastward away from the beach at the extreme south end of Wasaga Beach. The fourth difficult passage is at the outlet of Jack Lake. In short, it would be very difficult to take a boat with a draught greater than that of a canoe past any of these four places except in high water, and unless the water was four or five feet deeper than the normal summer flow an outboard motor could not be used. The river is navigable from the upper end of Jack Lake to Edenvale and beyond this area through the Minesing Swamp, but in the Minesing Swamp there are numerous "dead-heads", and many trees overhang the banks and are likely to fall eventually into the river unless they are removed. In the Minesing Swamp section there are many opportunities for wildlife observation. If the Authority acquires any of this area for forestry or other purposes, the removal of unstable stream-bank trees would be an aid to navigation. The Conservation Authority has already acquired an access point to the river at Edenvale, and the Department of Highways roadside park at Angus could easily be developed into a similar point, while there is, of course, free access to the river already existing at Wasaga Beach.

The third phase of action recommended is the acquisition of additional areas within the zones of greater potential. Essentially this phase should be flexible, and would be made as a response to the relative popularity of the Conservation Areas and access routes already established. If the demand warrants it, additional facilities can be developed on the boundary of Essa and Vespra Townships, at Highway 90. Two other areas are recommended as alternatives to the Essa Bluffs Area if this cannot be acquired. Later on the extent of the Mono Caves Area may be increased. A demonstration of erosion control and tree-planting techniques could be begun in the Mono Caves Area and, if this is considered successful, similar but smaller demonstrations could be arranged in some of the other Conservation Areas. Later it may become necessary to develop small roadside picnic sites on the most frequented access routes. This would best be carried out with the co-operation of the Department of Highways where the roads involved are Provincial Highways.

One of the westerly waterfalls in the Scott's Falls Area. This fall is easily accessible both from the north and from the south. Part of a small cavern is visible on the right of the picture.

The easterly waterfall of the Scott's Falls Area.


PROPOSED
SCOTT'S FALLS CONSERVATION AREA
LEGEND
BOUNDARY OF PROPOSED AREA
CLIFF
STEEP BANK
WOODLAND
BUILDINGS
SCALE
660 330 0 660 1320 1980
FEET
L.&F. CONSERVATION AUTHORITIES BR. T.L.L. 1963
1¾ MILES TO CAMILLA
LOT 13
LOT 12
LOT 11
FALLS
PROPOSED PARKING AREA
TO NOTTAWASAGA R.
MONO TWP.
CON. IE
CON. IIE
1MI TO HWY 10

# CHAPTER 4

## AREAS RECOMMENDED FOR ACQUISITION

### 1. Scott's Falls Conservation Area

This is an area of 100 acres in Mono Township, as shown on the accompanying plan.

The area recommended consists of the gorge of an unnamed river, a tributary of the upper Nottawasaga, as it cuts through the Silurian dolomite of the Niagara Escarpment, and two sections of the level or gently rolling surface which tops the escarpment. These latter sections have shallow soils and present frequent rock outcrops which, while adding charm, present certain problems in development for recreation, as will be explained below. In its passage the river flows over three sets of waterfalls separated by series of rapids. High cliffs flank the river along most of its course through the area, but in some places these are masked to some degree by debris slopes. The area as a whole is very well wooded with hemlock, elm, cedar, poplar and birch.

The major attraction of the proposed Conservation Area is the gorge, which is extremely spectacular. It is, however, necessary to recommend, in addition, fairly level areas for parking and camping. Naturally these are at some considerable height above the river and separated from it, in most cases, by cliffs or exceedingly steep slopes. The prime problem in the development of the area is therefore the satisfactory linkage of these upper areas with the stream and with each other. The upper falls may be reached by a lane from a concession road, but this lane leads to a farm which is in operation. There is a much better access route from the south, which passes through patches of woods. However, it would be extremely difficult for a person who is not energetic to climb down the steep slope to get a view of the gorge. It would probably be advisable to cut a few trees on the precipitous slope to allow a first-class view of the gorge from above, for those who cannot climb down. The principal development envisaged in the gorge itself is a trail following the river, with branch trails leading off to points of special interest. Swimming facilities could be provided only in small holes formed by damming the river, which here is passing over bedrock.

The upper areas, because of their shallow soils and frequency of rock outcrop, present obstacles to surface levelling. Fortunately, however, fairly level sites exist naturally, and it is estimated that at least 200 cars could be accommo-

dated on the southern section without any modification of the site. The provision of septic tanks for camp sites may, however, be a more serious problem.

Access to the area is easy. Two unpaved roads run from Highway 10 to the northern and southern sides of the gorge. The distance from Highway 10 to the northern side of the gorge is three miles and to the southern side is two miles. The Falls are also reached by some fishermen who walk up the bed of the river.

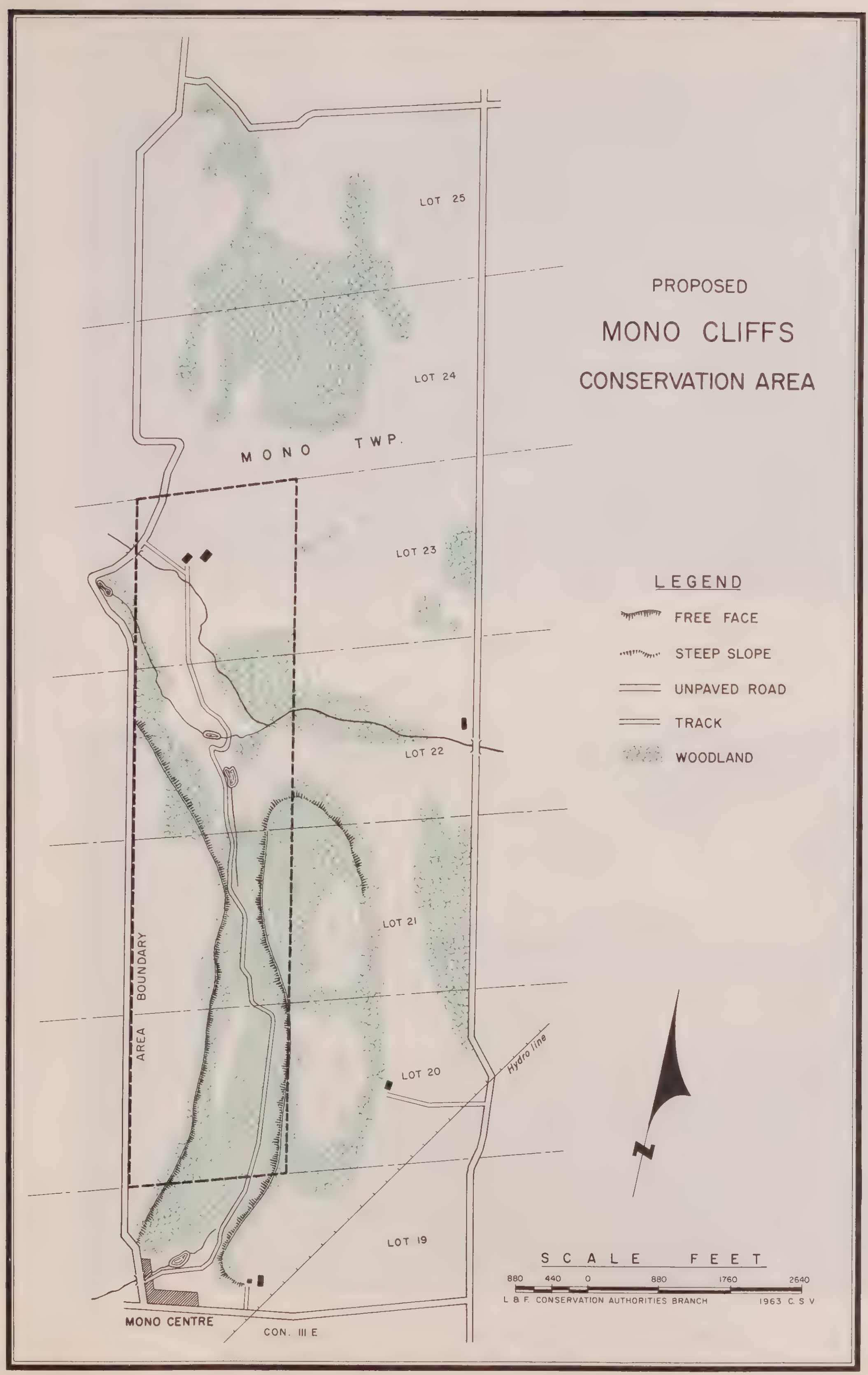
2. Mono Cliffs Conservation Area

This is an area of 182 acres in Mono Township, as shown on the accompanying plan.

The land is made up of a level to rolling valley floor flanked by vertical cliffs of dolomite, together with the rolling surfaces on top of the cliffs. The cliff on the western side of the area is part of the Niagara Escarpment itself, while that on the east is of a small but high outlier or island of stone. Three minor streams occupy the valley at present. Two of these actually rise from springs within the area. These same two streams have been impounded to produce three small ponds, the southernmost of which, it may be noted, is drained by seepage only. The southern section of the area, as well as the flanks of the cliffs and considerable portions of the upper surfaces, are well wooded with elms, hemlock, beech, maple, birch, cedar, and also with plantations of pines.

Spectacular views are afforded from the top of the cliffs, and these are the paramount attractions of the site. As with many spectacular sites, however, there is an element of danger. Therefore, except for a properly fenced lookout point at the edge of the escarpment itself, it is recommended that the main development be confined to the valley bottom. Here excellent camping sites and abundant level land for parking are available. It should be pointed out that the sheltered nature of the valley allows it to become quite hot in summer and therefore some emphasis should be placed upon replanting for shade and the provision of larger areas of water. The natural relief of the valley itself makes the enlargement and joining of the two southerly ponds and the development of a pond on the third stream appear quite feasible.

Acquisition should take place in two stages. The northern section is recommended for immediate acquisition and the southern section should be acquired later. The area is 3½ miles by unpaved road due south of Highway 89, and 2½ miles due east from Highway 10.


PROPOSED
MONO CLIFFS
CONSERVATION AREA
LEGEND
FREE FACE
STEEP SLOPE
UNPAVED ROAD
TRACK
WOODLAND
LOT 25
LOT 24
MONO TWP.
LOT 23
LOT 22
LOT 21
LOT 20
LOT 19
AREA BOUNDARY
Hydro line
MONO CENTRE
CON. III E
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A view looking south in the proposed Mono Cliffs Conservation Area.

The wooded bluffs in the proposed Mono Cliffs Conservation Area, and the extensive park-like lands beneath them.

A view of the middle pond at the Mono Cliffs Area. The rolling nature of the valley floor can be seen.

A view of the road that winds from Mono Centre to the Mono Cliffs Area.

3. Essa Bluffs Conservation Area

This is an area of 296 acres in Essa Township, as shown on the accompanying plan.

Through this area the Nottawasaga River follows a meandering course across a section of the Essa Sand Plain. The river here has entrenched itself some 50 to 70 feet below the general surface of the land, giving rise to slopes which are fairly steep but not dangerously so. In places these have been subject to minor dissection, but elsewhere terracing is perceptible, with three small level areas having been produced. The slopes are wooded with elm, cedar, poplar, birch and ash. At the bottom of the valley, only narrow, intermittent flats have been produced and these are subject to occasional flooding. The river here is broad, but its depth is very variable because of the continual erosion and redisposition of the sand shoals and banks within its bed.

The Conservation Area, then, is made up of an upper sandy section; a partially dissected slope with, in places, narrow terraces; and narrow flats with a broad river flowing over an uneven and shifting sand bed. The river can be made to afford quite good swimming facilities, while the broken wooded land is attractive for trails and camping. The whole area when viewed from the upper or sand plain level has a very considerable attraction. The proposed Conservation Area lies only 3½ miles by unpaved roads south-east from Angus or a similar distance due south from Highway 90.

It will be noted, from the accompanying map of the proposed Essa Bluffs Conservation Area, that while one section of land has been surrounded by a heavy broken line to indicate the suggested Conservation Area, actually three areas are shown on the map. These are designated as Areas A, B and C.

Area A is the presently recommended Conservation Area. Area B is an extremely interesting ox-bow of the Nottawasaga River which is in fact more spectacular here than in the recommended Area. There is an extremely high bluff over the river at the northern end of the road which passes through a plantation. Close to the end of this road along the bluffs above the river there is a quite satisfactory parking area; this has already been bought by an ethnic group which has established a camp on the east side of the Nottawasaga River. Thus there is no parking space available for Area B at the present time. There is also the disadvantage that the road running through the plantation is a one-lane road and would have to be widened to two lanes. However, there is the possibility that the old

bridge which formerly crossed the Nottawasaga near the east end of Area B may be replaced with a new bridge. If this work is carried out parking space might be made available reasonably close to Area B.

Area C on the accompanying map is a very attractive woodlot also fully enclosed in a bend of the Nottawasaga River. This area has a pond which is attractive to wildfowl, but the area as a whole has the very serious disadvantage that it is cut off from any access at present by the Hydro right-of-way which is shown on the map, and there is no access from a main road without the purchase of considerable additional land, now being farmed. It must be noted that there are no bridges across the Nottawasaga Valley in the general vicinity of Areas B and C and the river is wide and expensive to bridge. It is solely for these reasons that Areas B and C are considered only as possible future extensions and not included in the primary recommendation at this time.

4. Thompsonville Conservation Area

This is an area of 180 acres, as shown on the accompanying plan.

This area is, in several essentials, similar to the Essa Bluffs Area, although the river here follows a much less markedly meandering course. The Nottawasaga River has cut down through the sand plain to a depth of 30 or 40 feet below the general surface level. Thus the narrow flood plain is skirted by steep bluffs, which, where not wooded, have been subjected to a certain amount of gully erosion. However, the bluffs are in general the only portion of the area which remains under woodland. The components of the woodland are hemlock, elm, maple, cedar and poplar. The rest of the area has been long since cleared. The northern section embraces part of a drumlin, which rises to a height of 110 feet above the general surface of the plain. The part of the drumlin lying within the proposed Conservation Area gives a most attractive view of the surrounding countryside. The same kind of development is envisaged for this area as was described for the Essa Bluffs Area. In relation to the latter, it stands as a first reserve, in case the demand for this particular type of development should prove heavy. This area lies about 1 mile south of a point on Highway 89, three miles east of Alliston.

5. Singhampton Conservation Area

This is an area of 71 acres, including part of Edward Lake. There are 32 acres of land and 39 acres of water.

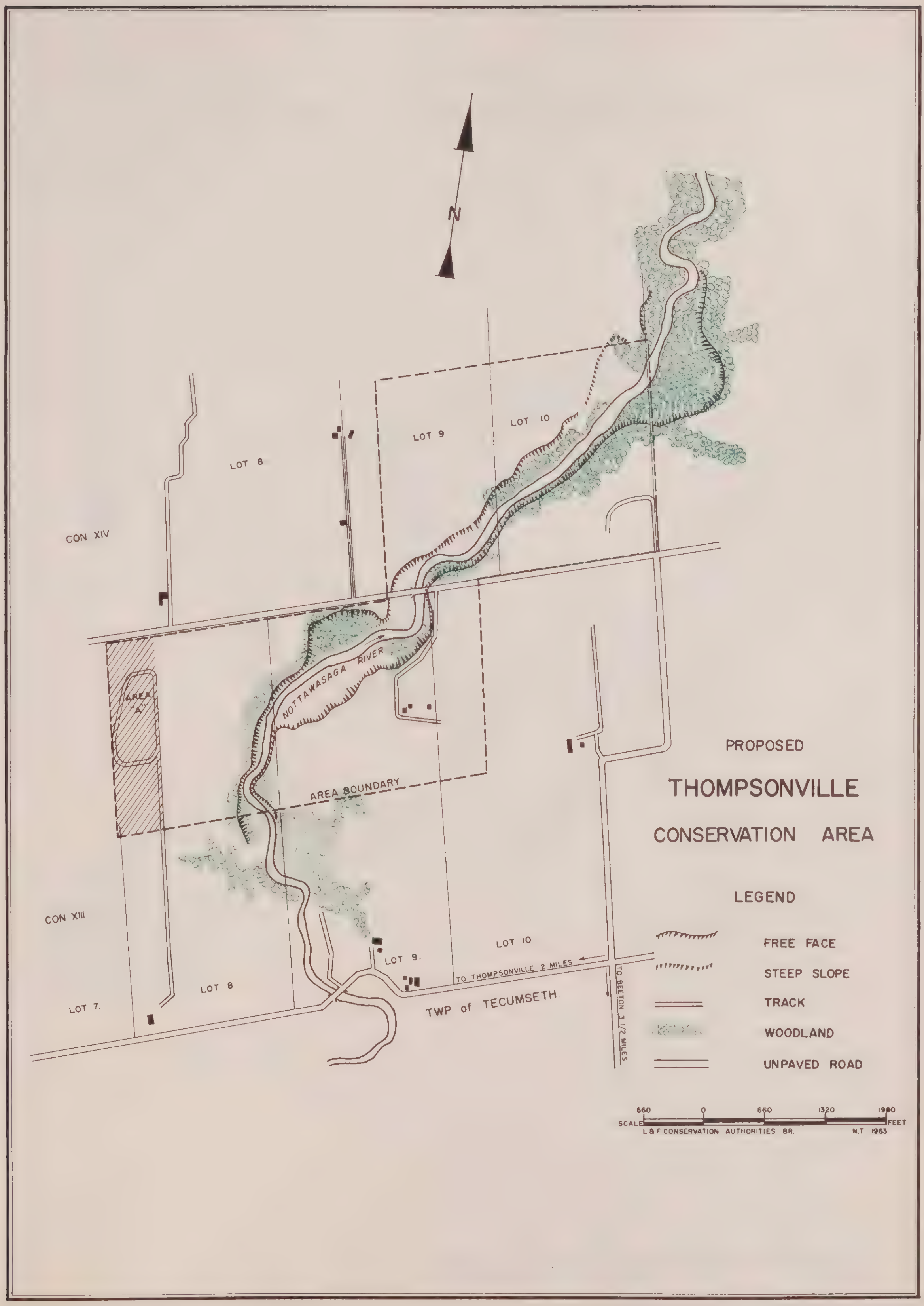
This proposed Conservation Area lies in the till moraines one mile to

PROPOSED

# ESSA BLUFFS CONSERVATION AREA

The Essa Bluffs Area. The Bluffs are hidden by dense tree cover and the Nottawasaga River meanders through the area.

A view looking north from the road which crosses the proposed Essa Bluffs Conservation Area. The gully erosion should be noted. A demonstration of gully control techniques could be made on this site.


N
LOT 8
LOT 9
LOT 10
CON XIV
NOTTAWASAGA RIVER
AREA "A"
AREA BOUNDARY
CON XIII
LOT 7.
LOT 8
LOT 9.
LOT 10
TO THOMPSONVILLE 2 MILES
TO BEETON 3 1/2 MILES
TWP of TECUMSETH.
PROPOSED
THOMPSONVILLE
CONSERVATION AREA
LEGEND
FREE FACE
STEEP SLOPE
TRACK
WOODLAND
UNPAVED ROAD
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PROPOSED
SINGHAMPTON CONSERVATION AREA
NOTTAWASAGA TWP.
LOT 22
LOT 21
LOT 20
EDWARD L.
AREA BOUNDARY
SINGHAMPTON 3/4 MILE
CON. XII.
SCALE : FEET
660 0 660 1320 1980 2640
L. & F. CONSERVATION AUTHORITIES BRANCH
1963 C.S.V.

the north of Singhampton. The focus of the whole proposed development would be on the lake itself. The lake bottom has a fair amount of sand and it shelves gently away from the shore. The water should, therefore, warm up well in summer, and undesirable debris is limited to a few logs in the water. Moreover, throughout the whole area recommended for acquisition, firm ground runs right down to the water's edge. Substantial sections of the shore frontage are wooded with poplar, elm and birch.

In the north-western section of the area recommended, Silurian dolomite outcrops, producing an intermittent free face about ten feet high, are present, while to the southward there is a wet hollow, carrying such trees as poplar, willow, birch, ash and tamarack. The intervening land between and around these features is rolling.

The lake itself has already experienced some development in its northern half, in the form of two substantial houses. If any part of this lake should come up for sale it should be acquired by the Authority, but the area specifically recommended in this report includes the southern and south-western shores of the lake. It is suggested that at least one out of the three farms bordering the lake might be bought to give proper space for parking and camping. The area would then have general facilities such as camping, picnicking and good swimming and excellent views over the lake.

## 6. Colwell Conservation Area

This is an area which may in the future provide an excellent recreation area, and which should be kept in mind by the Conservation Authority for future consideration. It consists of 87 acres of land, part of Lot 22, Concession XII, in Vespra Township, and 118 acres, part of Lot 32, Concession VIII, in Essa Township.

These lands are now being used as a source of gravel by Canadian National Railways.

When the new Toronto Canadian National Railways yards have been completed it can be expected that there will be a rapid drop in the use of this yard. At present four train-loads of gravel leave this pit daily, bound for the new Toronto yards, but this operation is expected to be terminated in 1964. It has not yet been decided whether the railroad, which runs to Penetanguishene, will continue long in operation. There is an application, now before the Board of Transport Commissioners, to close the railroad to Penetanguishene, but the Board has not yet approved of the closure.

There are already two areas of permanent water in the gravel pits. It should be an easy matter to enlarge these areas so that excellent swimming would thus be available close to Barrie. It is well known that there is considerable pollution of Lake Simcoe in the vicinity of Barrie and this new Conservation Area, which lies directly on each side of Highway 90, would, if it could be developed, become an extremely important strategic location for recreation activities. A small amount of washed sand could be brought in to provide an excellent beach.

This area also provides an opportunity and a challenge to demonstrate techniques of reclaiming an otherwise barren piece of land. Reforestation could certainly be undertaken. Parking should present no problems as a suitable area could be bulldozed level in an hour or two. It is recommended that the Conservation Authority enter into negotiations with Canadian National Railways concerning this property as soon as possible.

7. Other Recreation Areas

(a) Pretty River

The Pretty River valley provides the most spectacular scenery in the region, in addition to a beautiful and clear stream. It is recommended that the Conservation Authority acquire sufficient land to provide good parking space near the road which passes down the valley. Possibly a scenic lookout could be constructed at some point between the lower slopes and the hamlet of Rob Roy.

(b) New Lowell

The restoration of the dam at New Lowell is another project in which the Conservation Authority might make a significant contribution to the recreation facilities of the region. This appears to be an expensive project and could hardly be undertaken at the present time.

(c) Tottenham

Another recreation area which is being increasingly used by residents in the south-east part of the valley is the Tottenham Pond. This pond attracts many trout fishermen and is extensively used for swimming.

The earth fill dam, which had given way, has been replaced. It appeared from the recreation survey that the approaches to the concrete spillway were in very poor condition. Broken concrete (with the spaces between the concrete unfilled) had been used to fill the area close to the spillway. It is recommended that an engineer's examination of this spillway be made.


## PROPOSED
# COLWELL CONSERVATION AREA

LEGEND

Area boundary

Woodland

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The pond and the surrounding land could be acquired by the Conservation Authority. The facilities provided at present appear to be sub-standard. Debris lies on the edge of the beach, and no proper change room is provided. There should be facilities here that are in keeping with those in other well developed Authority parks.

This is an excellent opportunity for the Conservation Authority to carry out a project in a part of the watershed where no other major recreation recommendations have been made.